COOLING(H4DO)

CO(H4DO)

1. General Description
2. Radiator Fan System
3. Engine Coolant
4. Water Pump
5. Water Pipe
6. Thermostat
7. Radiator
8. Radiator Cap
9. Radiator Hose
10. Radiator Fan and Fan Motor Assembly
11. Reservoir Tank
12. Symptoms and causes

CAUTION

- When performing service operation, refer to "Repair Contents" in "General Description". Ref. to REPAIR CONTENTS>Repair Contents.
- Prior to starting work, pay special attention to the following:
  1. Always wear work clothes, a work cap, and protective shoes. Additionally, wear a helmet, protective goggles, etc. if necessary.
  2. Protect the vehicle using a seat cover, fender cover, etc.
  3. Prepare the service tools, clean cloth, containers to catch grease and oil, etc.
- Prevent scattering of grease and oil. If it scatters, wipe it off immediately to prevent it from penetrating the floor or flowing out, to protect the environmental.
- If the grease and oil is spilt over the engine, exhaust pipe or the under cover, completely wipe it off to avoid emission of smoke or causing a fire.
- Vehicle components are extremely hot immediately after driving. Be wary of receiving burns from heated parts.
- When performing a repair, identify the cause of trouble and avoid unnecessary work.
- Before disconnecting connectors of sensors or units, be sure to disconnect the ground terminal from the battery sensor.
- Always use the jack-up point when the lifting device, shop jacks or rigid racks are used to support the vehicle.
- Before starting works, remove dirt and corrosion around the target area.
- Keep the removed parts in order and protect them from dust and dirt.
- All removed parts, if to be reused, should be reinstalled in the original positions with attention to the correct directions, etc.
- For the parts except for the non-reusable parts, replace then with new parts if necessary.
- Be sure to tighten bolts and nuts to the specified torque.
- Follow all government and local regulations concerning disposal of refuse when disposing engine coolant.

SPECIFICATION

1. COOLING SYSTEM

Cooling system	Electric fan + Forced engine coolant circulation system

2. WATER PUMP

Type			Centrifugal impeller type
Pump characteristics	Discharge rate	L (US gal, Imp gal)/min	246.5 (65.13, 54.23)
	Engine coolant temperature	°C (°F)	80 (176)
	Engine coolant	%	50

	concentration		
	System pressure	kPa (mAq)	88 (9.0)
	Pump speed	r/min	7,680
Impeller diameter		mm (in)	56.5 (2.22)
Number of impeller vanes		pcs.	7
Pump pulley effective diameter		mm (in)	111.2 (4.38)

3. THERMOSTAT

Type			Wax pellet type
Starting temperature to open	°C (°F)	Engine side	86 — 90 (187 — 194)
		Water tank pipe side	48 — 52 (118 — 126)
Full open temperature	°C (°F)	Engine side	95 (203)
		Water tank pipe side	63 (145)
Valve lift	mm (in)	Engine side	8.0 (0.315) or more
		Water tank pipe side	6.0 (0.236) or more
Valve opening size	mm (in)	Engine side	32 (1.26)
		Water tank pipe side	22 (0.87)

4. RADIATOR FAN

Motor input	W	Main fan	200
		Sub fan	200
Fan outer diameter	mm (in)	Main fan	300 (11.8)
		Sub fan	300 (11.8)
Number of fan blades	pcs.	Main fan	7
		Sub fan	9

5. RADIATOR

Type				Side flow, pressure type
Core dimensions	mm (in)	Width × Height × Thickness		649.2 × 357 × 27 (25.56 × 14.06 × 1.06)
Pressure range in which cap valve is open	kPa (kg/cm^2, psi)	Positive pressure side	Standard	93 — 123 (0.95 — 1.25, 14 — 18)
			Limit	83 (0.85, 12)
		Negative pressure side	Standard	The barometric pressure or less
Fin shape				Corrugated fin

6. ENGINE COOLANT

- **TYPE**

Note: **The SUBARU Super Coolant contains anti-freeze and anti-rust agents, and is especially made for Subaru engines with an aluminum cylinder block.** **Be sure to use SUBARU Super Coolant, since other coolant may cause corrosion.**	
Engine coolant	**Recommended materials:** SUBARU made SUBARU SUPER COOLANT*1 *2
Cooling system protective agent	**Recommended materials:** SUBARU made Cooling system conditioner (part No. SOA345001)

*1: Distilled water is recommended for dilution. Soft water or tap water can be used alternatively.

*2: There are two types of SUBARU SUPER COOLANT: concentrated type and diluted type (part number: K0670Y0001).

- **CONCENTRATION**

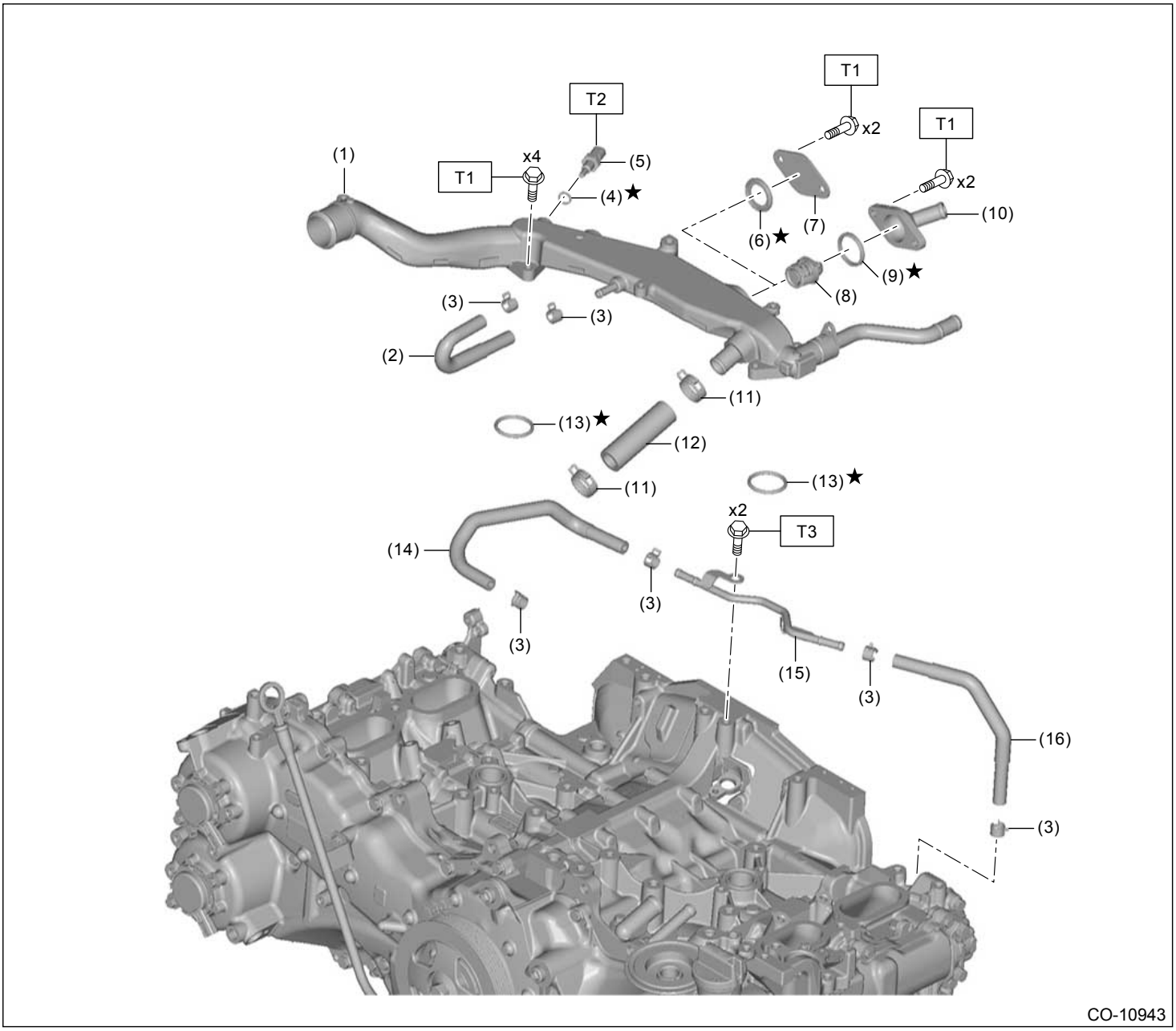
Caution: **Use the SUBARU Super Coolant with a 50 — 60 % concentration in order to obtain maximum anti-freeze and anti-rust performance.**			
Note: **To adjust the concentration of SUBARU Super Coolant according to temperature, find the proper SUBARU Super Coolant concentration from the table below, and add dilution water to the SUBARU Super Coolant (concentrated type) until it reaches the proper dilution.**			
SUBARU Super Coolant concentration	50%	55%	60%
Freezing temperature	−36°C (−33°F)	−41°C (−42°F)	−50°C (−58°F)

- **CAPACITY**

Total capacity	L (US qt, Imp qt)	AT model	Approx. 7.7 (8.1, 6.8)
		MT model	Approx. 7.4 (7.8, 6.5)
Reservoir tank capacity	L (US qt, Imp qt)	0.45 (0.476, 0.396)	

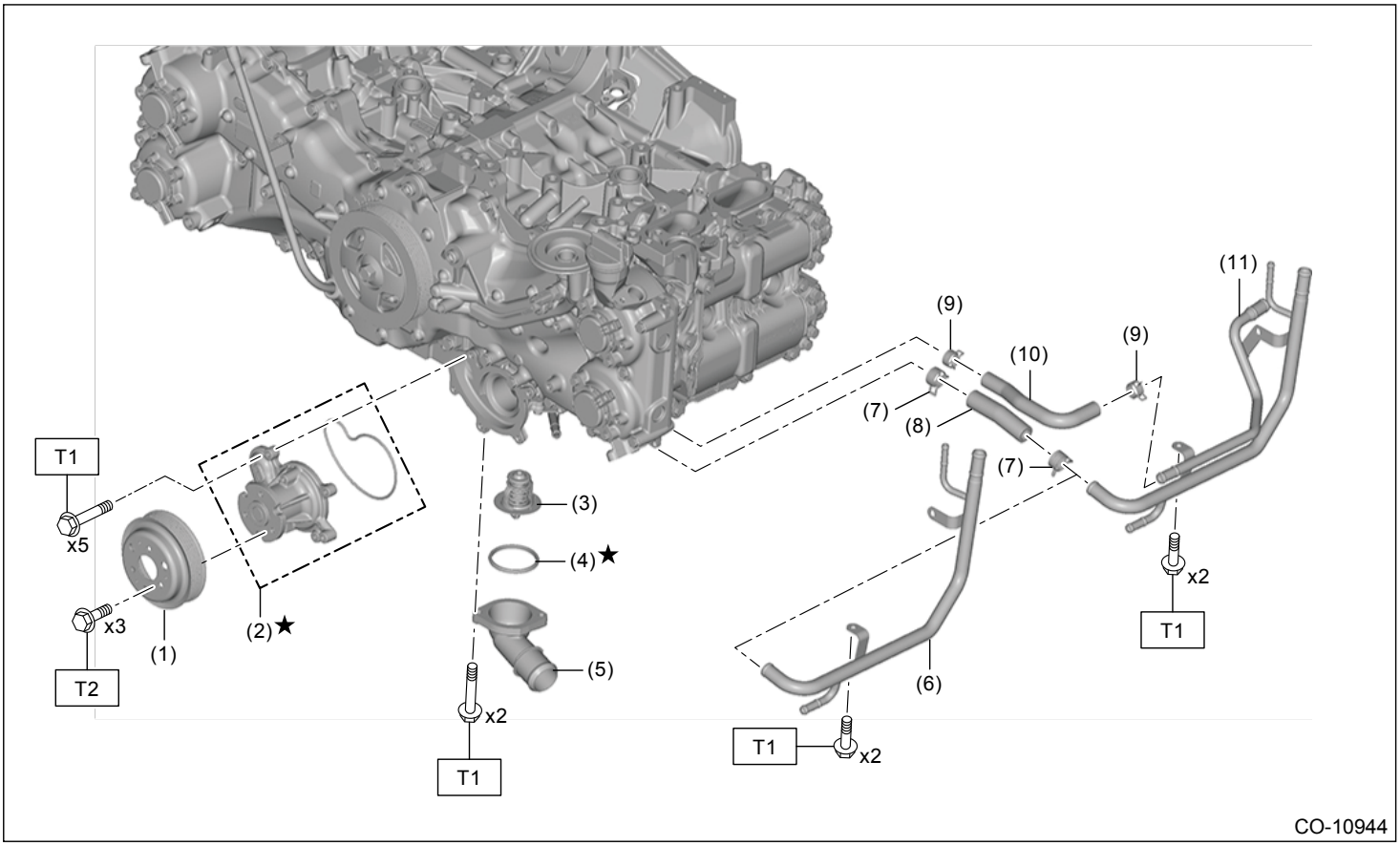
COMPONENT

1. ENGINE COOLING SYSTEM 1



(1)	Water tank pipe ASSY	(9)	Gasket (AT model)	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Preheater hose	(10)	Thermostat cover (AT model)	***T1: 6.4 (0.7, 4.7)***
(3)	Clip	(11)	Clip	***T2: 16 (1.6, 11.8)***
(4)	Gasket	(12)	Water hose	***T3: 19 (1.9, 14.0)***
(5)	Engine coolant temperature sensor	(13)	O-ring	
(6)	Gasket (MT model)	(14)	Preheater hose	
(7)	Cover (MT model)	(15)	Preheater pipe	
(8)	Thermostat (AT model)	(16)	Preheater hose	

2. ENGINE COOLING SYSTEM 2

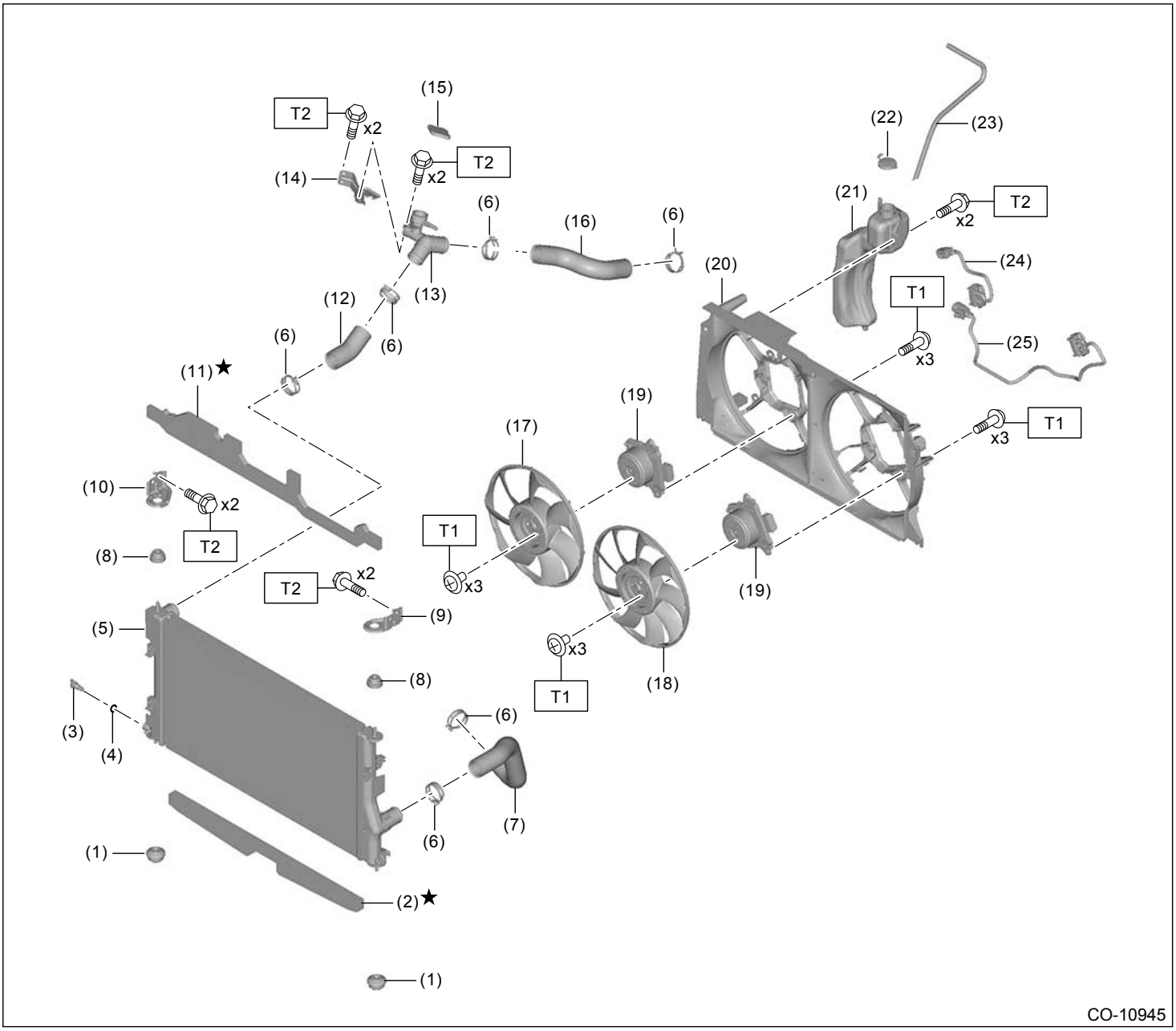


(1) Water pump pulley
(2) Water pump ASSY
(3) Thermostat
(4) Gasket
(5) Thermostat cover
(6) Water pipe (MT model)
(7) Clip
(8) Water hose
(9) Clip
(10) Water hose
(11) Water pipe (AT model)

Tightening torque: N·m (kgf-m, ft-lb)

T1: 6.4 (0.7, 4.7)
T2: 14 (1.4, 10.3)

3. RADIATOR & RADIATOR FAN



(1) Radiator lower cushion
(2) Radiator lower gasket
(3) Radiator drain plug
(4) O-ring
(5) Radiator
(6) Radiator hose clip
(7) Radiator outlet hose
(8) Radiator upper cushion
(9) Radiator upper bracket LH
(10) Radiator upper bracket RH
(11) Radiator upper gasket
(14) Bracket
(15) Radiator cap
(16) Radiator inlet hose No. 1
(17) Radiator main fan
(18) Radiator sub fan
(19) Fan motor ASSY
(20) Radiator fan shroud
(21) Reservoir tank
(22) Reservoir tank cap
(23) Over flow hose
(24) Radiator main fan harness

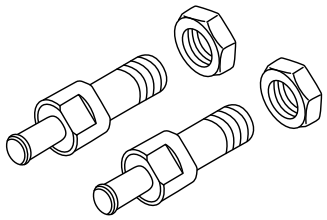
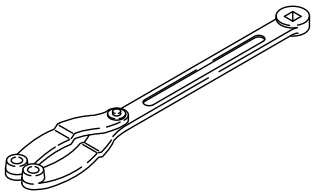
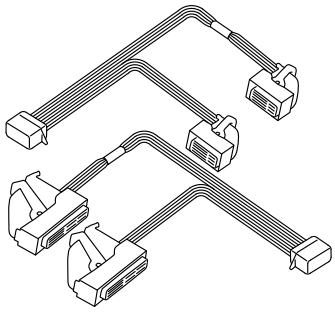
Tightening torque: N·m (kgf-m, ft-lb)

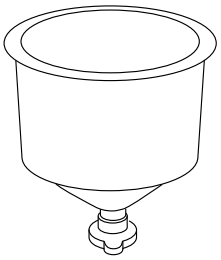
T1: 3.8 (0.4, 2.8)
T2: 7.5 (0.8, 5.5)

(12) Radiator inlet hose No. 2
(13) Filler ASSY
(25) Radiator sub fan harness

PREPARATION TOOL

1. SUBARU SPECIAL TOOL

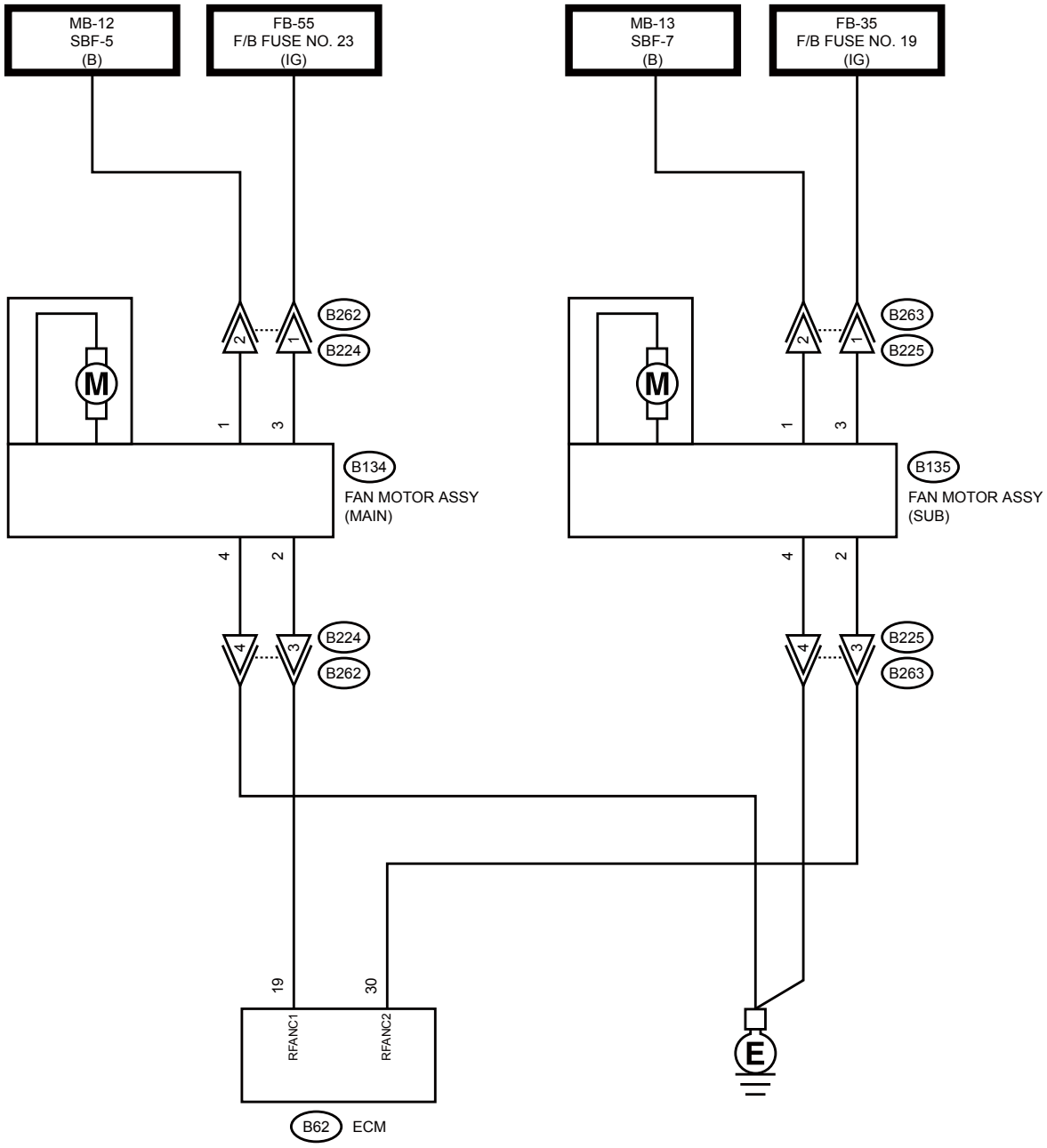
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18334AA030	18334AA030	PULLEY WRENCH PIN SET	• Used for removing and installing water pump pulley. • Used together with PULLEY WRENCH (18355AA000).
 ST18355AA000	18355AA000	PULLEY WRENCH	• Used for removing and installing water pump pulley. • Used with PULLEY WRENCH PIN SET (18334AA030).
 ST18460AA180	18460AA180	CHECK BOARD	Used for measuring voltage and resistance of ECM terminals.
	45099SJ000	ST COOLANT CHARGER	Used for filling the radiator with engine coolant.

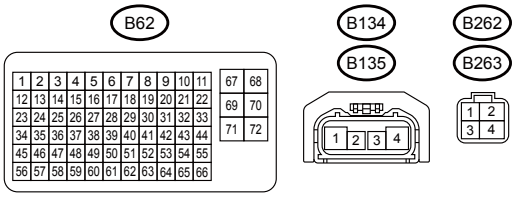
 ST45099SJ000			
 STSSM4	—	SUBARU SELECT MONITOR 4	Used for setting of each function and troubleshooting for electrical system. **Note:** • **For detailed operation procedures, refer to "Help" of application.** • **Used together with interface for Subaru Select Monitor (such as DST-i and DST-010).**

2. OTHER

	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Radiator cap tester	Used for checking radiator and radiator cap.
Oscilloscope	Used for inspecting the radiator fan control output waveforms.

WIRING DIAGRAM





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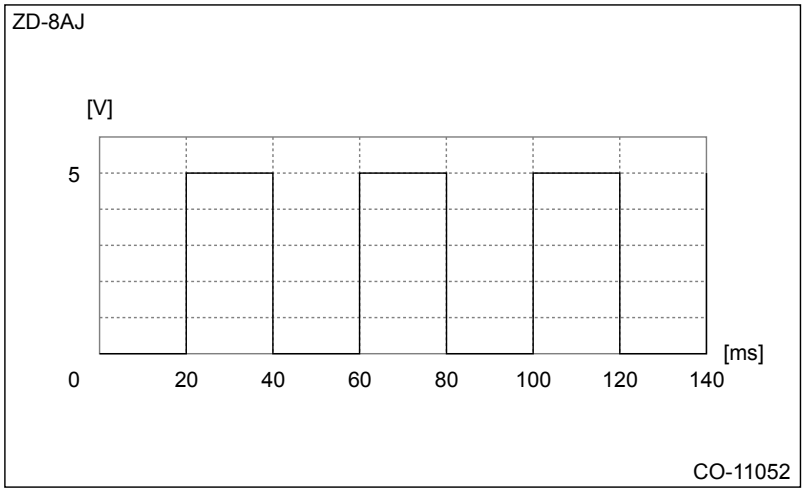
RADIATOR FAN CONTROL OUTPUT WAVEFORM



COOLING(H4DO) > Radiator Fan System

INSPECTION

Caution:

Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DO)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.

Diagnosis:

Radiator main fan and radiator sub fan do not rotate.

1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read all DTCs. Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC displayed?

Yes	Perform the diagnosis for the displayed DTCs.
No	Go to 2.

2. CHECK RADIATOR MAIN FAN AND RADIATOR SUB FAN OPERATION.

1. Using the Subaru Select Monitor, select [Radiator Fan Relay] of [Active Test]. Ref. to ENGINE (DIAGNOSTICS)(H4DO)>Active Test.

Note:
It is also possible to check the operation of the radiator main fan and radiator sub fan with the mode set to the delivery mode and ignition switch to ON. Ref. to PRE-DELIVERY INSPECTION>PRE-DELIVERY INSPECTION (PDI) PROCEDURE > DELIVERY MODE.

2. Check the operation of the radiator main fan and radiator sub fan.

Do the radiator main fan and radiator sub fan rotate with repetitive ON/OFF operation?

Yes — Radiator main fan system is normal.

No
- When the radiator main fan does not rotate, Go to 3.
- When the radiator sub fan does not rotate, Go to 8.

3. CHECK FUSE.

1. Turn the ignition switch to OFF.

Note:
If the delivery mode is set, turn the ignition switch to OFF and then exit the delivery mode. Ref. to PRE-DELIVERY INSPECTION>PRE-DELIVERY INSPECTION (PDI) PROCEDURE > DELIVERY MODE.

2. Check the SBF-5 and F/B fuse No. 23.

Is the fuse OK?

Yes — Go to 4.

No — Replace the fuse.

Note:
If the fuse is blown again, check the system wiring harness.

4. CHECK POWER SUPPLY TO FAN MOTOR ASSEMBLY (MAIN).

1. Disconnect the connector from the fan motor assembly (main).
2. Turn the ignition switch to ON.
3. Measure the voltage between the fan motor assembly (main) connector and chassis ground.

Connector & terminal

(B134) No. 1 (+) — Chassis ground (−):

(B134) No. 3 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes — Go to 5.

No — Repair the following item.

- Open circuit in the harness between fuse and fan motor assembly (main) connector
- Poor contact of coupling connector

5. CHECK GROUND CIRCUIT OF FAN MOTOR ASSEMBLY (MAIN).

Measure the resistance between the fan motor assembly (main) connector and chassis ground.

Connector & terminal

(B134) No. 4 — Chassis ground:

Is the resistance less than 5 Ω?

Yes — Go to 6.

No — Repair the following item.

- Open circuit in the harness between fan motor assembly (main) connector and chassis ground
- Poor contact of coupling connector

6. CHECK HARNESS BETWEEN ECM AND FAN MOTOR ASSEMBLY (MAIN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS) (H4DO)>Engine Control Module (ECM)>REMOVAL.
3. Check the open circuit and short circuit between ECM connector and fan motor assembly (main) connector.

   Connector & terminal

   (B62) No. 19 — (B134) No. 2:

Is the harness normal?

Yes — Go to 7.

No — Repair the following item.

- Open circuit or short circuit between ECM connector and fan motor assembly (main) connector
- Poor contact of coupling connector

7. CHECK OUTPUT SIGNAL OF ECM.

1. Connect the connector to the fan motor assembly (main).
2. Turn the ignition switch to ON.
3. Using the Subaru Select Monitor, select [Radiator Fan Relay] of [Active Test]. Ref. to ENGINE (DIAGNOSTICS)(H4DO)>Active Test.

   Note:
   It is also possible to check the output signal of ECM with the mode set to the delivery mode and ignition switch to ON. Ref. to PRE-DELIVERY INSPECTION>PRE-DELIVERY INSPECTION (PDI) PROCEDURE > DELIVERY MODE.
4. Read the output signal waveform using an oscilloscope. Ref. to COOLING(H4DO)>Radiator Fan System>RADIATOR FAN CONTROL OUTPUT WAVEFORM.

   Connector & terminal

   (B62) No. 19 (+) — Chassis ground (−):

Does a waveform of the output signal occur?

Yes	Replace the fan motor assembly (main). Ref. to COOLING(H4DO)>Radiator Fan and Fan Motor Assembly.
No	Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DO)>Engine Control Module (ECM).

8. CHECK FUSE.

1. Turn the ignition switch to OFF.

   Note:
   If the delivery mode is set, turn the ignition switch to OFF and then exit the delivery mode. Ref. to PRE-DELIVERY INSPECTION>PRE-DELIVERY INSPECTION (PDI) PROCEDURE > DELIVERY MODE.
2. Check the SBF-7 and F/B fuse No. 19.

Is the fuse OK?

Yes	Go to 9.
No	Replace the fuse. **Note:** **If the fuse is blown again, check the system wiring harness.**

9. CHECK POWER SUPPLY TO FAN MOTOR ASSEMBLY (SUB).

1. Disconnect the connector from the fan motor assembly (sub).
2. Turn the ignition switch to ON.
3. Measure the voltage between the fan motor assembly (sub) connector and chassis ground.

Connector & terminal

(B135) No. 1 (+) — Chassis ground (−):

(B135) No. 3 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes — Go to 10.

No — Repair the following item.

- Open circuit in the harness between fuse and fan motor assembly (sub) connector
- Poor contact of coupling connector

10. CHECK GROUND CIRCUIT OF FAN MOTOR ASSEMBLY (SUB).

Measure the resistance between the fan motor assembly (sub) connector and chassis ground.

Connector & terminal

(B135) No. 4 — Chassis ground:

Is the resistance less than 5 Ω?

Yes — Go to 11.

No — Repair the following item.

- Open circuit in the harness between fan motor assembly (sub) connector and chassis ground
- Poor contact of coupling connector

11. CHECK HARNESS BETWEEN ECM AND FAN MOTOR ASSEMBLY (SUB).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS) (H4DO)>Engine Control Module (ECM)>REMOVAL.
3. Check the open circuit and short circuit between ECM connector and fan motor assembly (sub) connector.

   Connector & terminal

   (B62) No. 30 — (B135) No. 2:

Is the harness normal?

Yes — Go to 12.

No — Repair the following item.

- Open circuit or short circuit between ECM connector and fan motor assembly (sub) connector
- Poor contact of coupling connector

12. CHECK OUTPUT SIGNAL OF ECM.

1. Connect the connector to the fan motor assembly (sub).
2. Turn the ignition switch to ON.
3. Using the Subaru Select Monitor, select [Radiator Fan Relay] of [Active Test]. Ref. to ENGINE (DIAGNOSTICS)(H4DO)>Active Test.

   Note:
   It is also possible to check the output signal of ECM with the mode set to the delivery mode and ignition switch to ON. Ref. to PRE-DELIVERY INSPECTION>PRE-DELIVERY INSPECTION (PDI) PROCEDURE > DELIVERY MODE.
4. Read the output signal waveform using an oscilloscope. Ref. to COOLING(H4DO)>Radiator Fan System>RADIATOR FAN CONTROL OUTPUT WAVEFORM.

   Connector & terminal

   (B62) No. 30 (+) — Chassis ground (−):

Does a waveform of the output signal occur?

Yes	Replace the fan motor assembly (sub). Ref. to COOLING(H4DO)>Radiator Fan and Fan Motor Assembly.
No	Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DO)>Engine Control Module (ECM).

INSPECTION

1. ENGINE COOLANT LEVEL CHECK

Caution:
- **Stop the engine.**
- **The engine coolant is pressurized when it is hot. Wait until engine coolant cools down before proceeding the work.**
- **If the engine coolant is spilt over the engine, exhaust pipe or the under cover, completely wipe it off to avoid emission of smoke or causing a fire.**
- **Do not use water instead of engine coolant.**

Engine coolant:

Refer to "SPECIFICATION" for engine coolant. Ref. to COOLING(H4DO)>General Description>SPECIFICATION>ENGINE COOLANT>TYPE.

Engine coolant concentration:

Refer to "SPECIFICATION" for engine coolant concentration. Ref. to COOLING(H4DO)>General Description>SPECIFICATION>ENGINE COOLANT>CONCENTRATION.

Note:

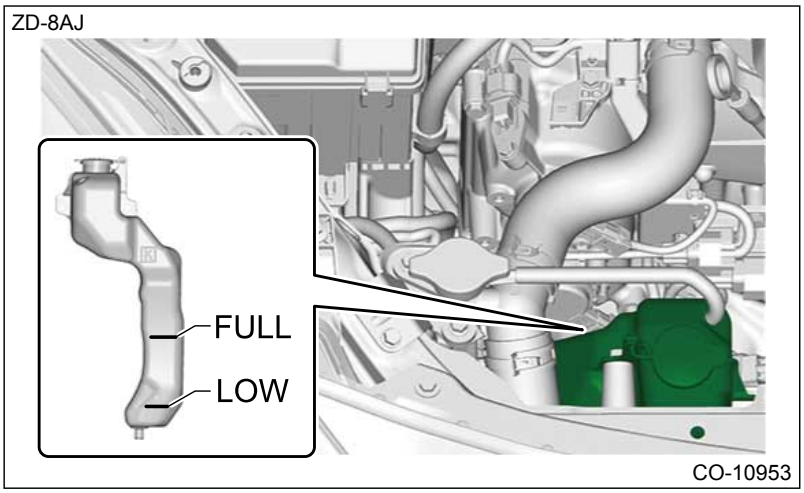
The SUBARU Super Coolant contains anti-freeze and anti-rust agents, and is especially made for Subaru engines with an aluminum cylinder block.
Be sure to use SUBARU Super Coolant, since other coolant may cause corrosion.

1. Park the vehicle on a level surface.
2. Check the engine coolant level, and add the engine coolant if the coolant level is low.

Note:

Coolant level in the reservoir tank may be reduced as a result of evaporation. It may be necessary to add coolant during servicing. If the customer reports a need to add coolant regularly, make sure to check for engine coolant leaks.

(1) Make sure the engine coolant level in the reservoir tank is between "FULL" and "LOW" with the engine in a cold condition.



(2) Open the radiator cap and make sure that the radiator is filled with the engine coolant up to its

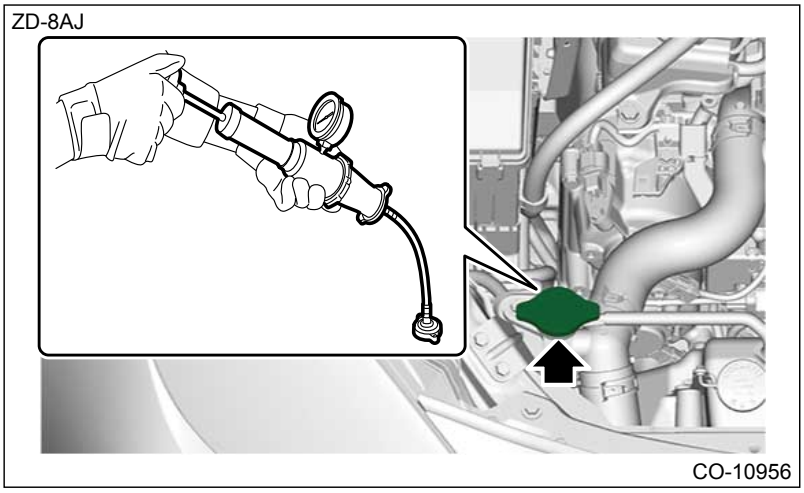
filler neck position.

2. ENGINE COOLANT LEAKAGE CHECK

Caution:
- **Stop the engine.**
- **The engine coolant is pressurized when it is hot. Wait until engine coolant cools down before proceeding the work.**
- **If the engine coolant is spilt over the engine, exhaust pipe or the under cover, completely wipe it off to avoid emission of smoke or causing a fire.**

1. Remove the radiator cap.
2. Fill the radiator with engine coolant, and then install the radiator cap tester to the filler neck of radiator.

Caution:
Be careful not to deform the filler neck of radiator when installing and removing the radiator cap tester.



3. Apply a pressure of 157 kPa (1.6 kg/cm^2, 23 psi) to the radiator and check the following points:
   - Leakage from the flow path of the engine coolant or its vicinity
   - Leakage from the hose or its connections
   - Significant pressure drop

Caution:
Be careful of engine coolant from spurting out when removing the radiator cap tester.

COOLING(H4DO) > Engine Coolant

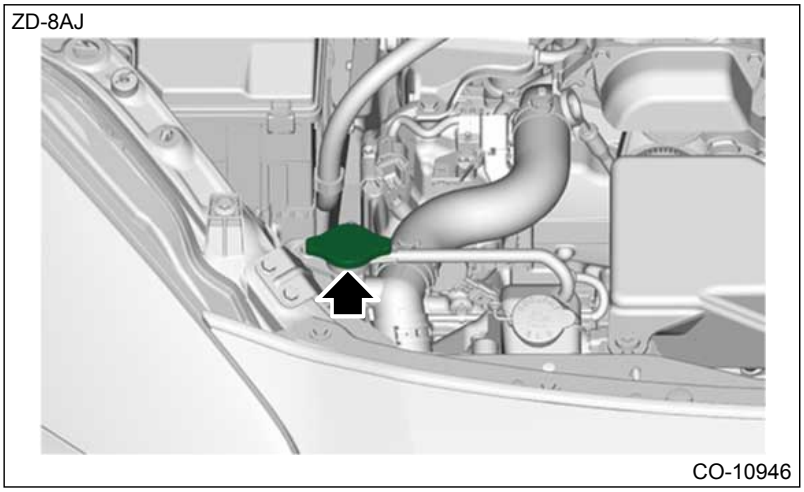
REPLACEMENT

1. DRAINING OF ENGINE COOLANT

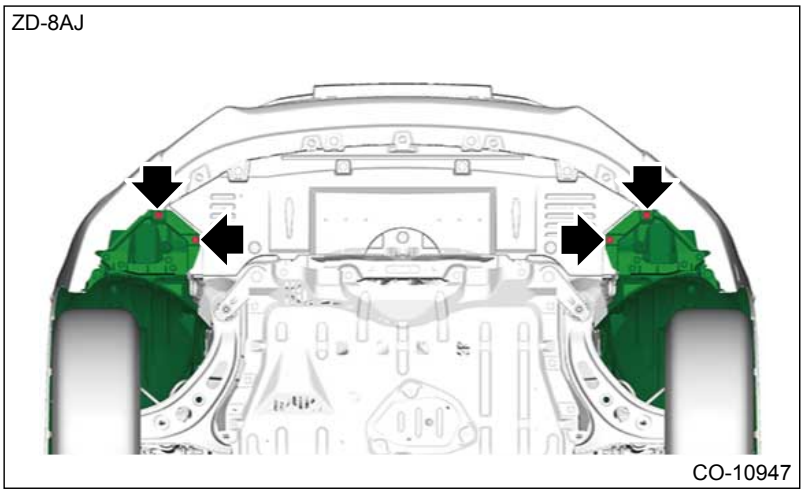
Caution:

- **The engine coolant is pressurized when it is hot. Wait until engine coolant cools down before proceeding the work.**
- **If the engine coolant is spilt over the engine, exhaust pipe or the under cover, completely wipe it off to avoid emission of smoke or causing a fire.**

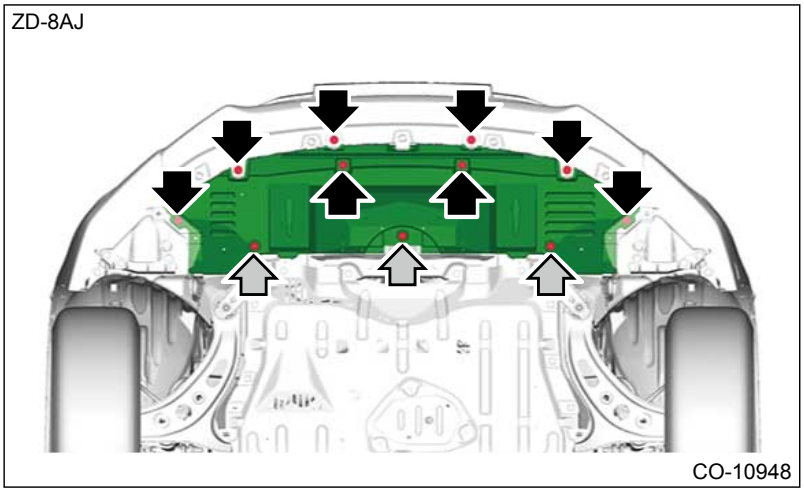
1. Remove the radiator cap.



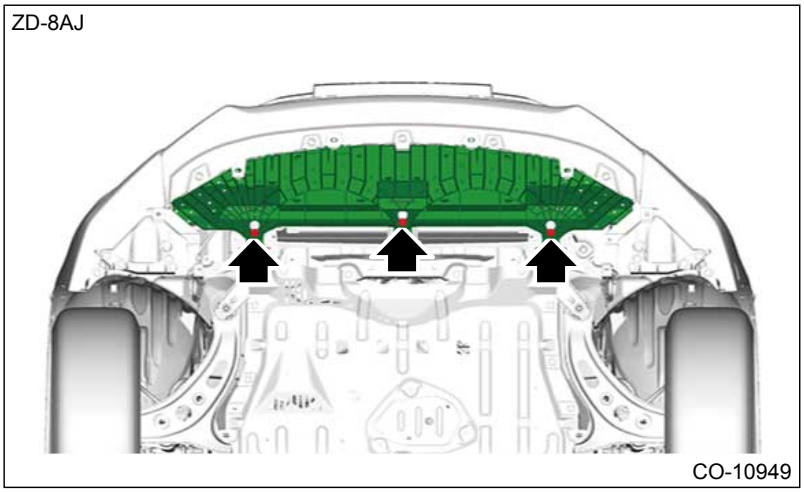
2. Remove the clips which secure the mud guard front RH and mud guard front LH.



3. Remove the cover bumper LWR.



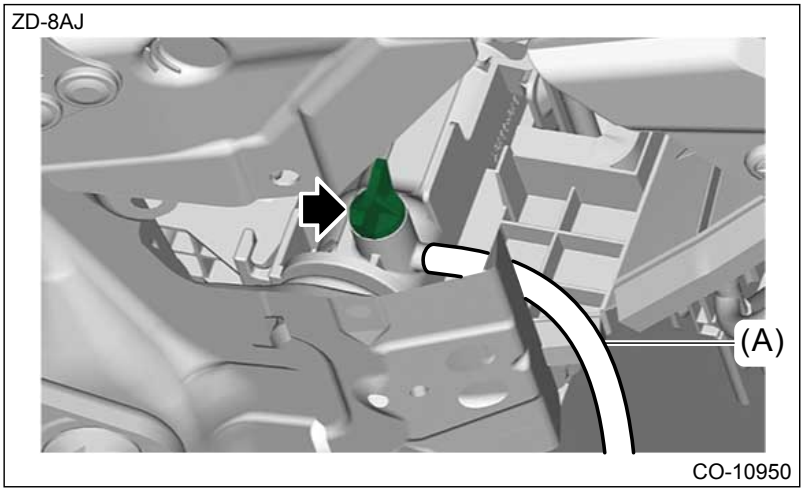
4. Remove the bracket center front LWR.



5. Connect hose (A) to the drain pipe of the radiator.

Note:
Use a hose with an inner diameter of 8.0 mm (0.315 in).

6. Loosen the radiator drain plug to drain engine coolant.



7. After draining the engine coolant, remove the radiator drain plug.

8. Check that the O-ring on the radiator drain plug has no deformation, cracks, or other damage.

Caution:

If the O-ring is faulty, replace it with a new O-ring.

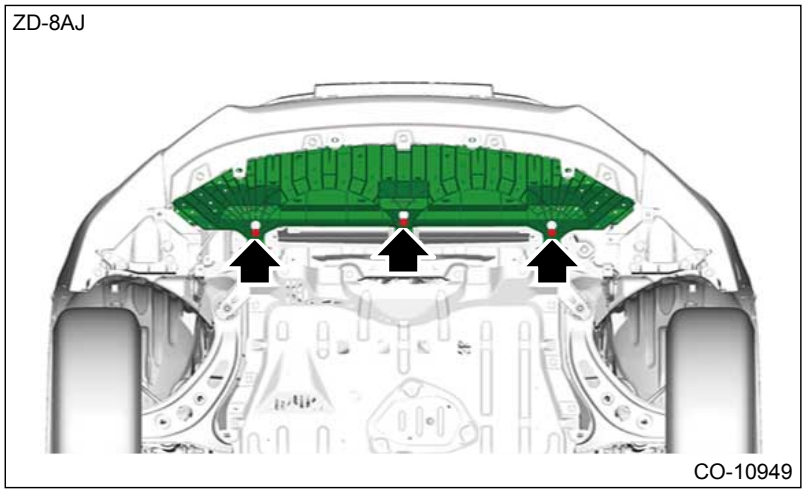
9. Install the radiator drain plug.

10. Remove the hose.

11. Install the bracket center front LWR.

Tightening torque:

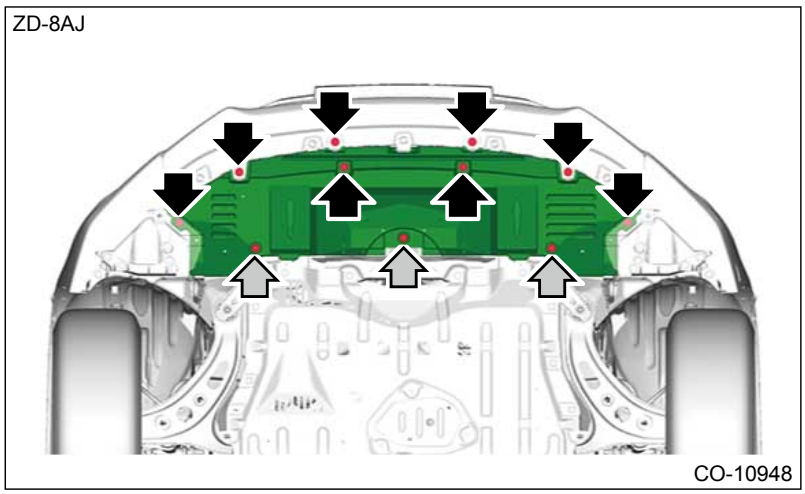
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



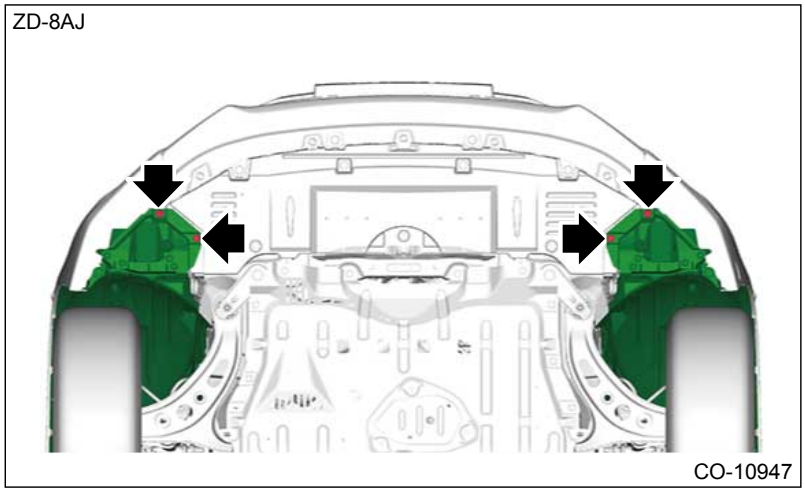
12. Install the cover bumper LWR.

Tightening torque:

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



13. Secure the mud guard front RH and mud guard front LH with the clips.



14. Drain the coolant from reservoir tank. Ref. to COOLING(H4DO)>Reservoir Tank.

2. FILLING OF ENGINE COOLANT

Caution:

- **For AT models, set the select lever to "P" or "N" range (for MT models, the MT shift lever in neutral) during work, and do not shift the lever.**
- **If the engine coolant is spilt over the engine, exhaust pipe or the under cover, completely wipe it off to avoid emission of smoke or causing a fire.**

Note:

- **The SUBARU Super Coolant contains anti-freeze and anti-rust agents, and is especially made for Subaru engines with an aluminum cylinder block.**
  Be sure to use SUBARU Super Coolant, since other coolant may cause corrosion.
- **Refer to "SPECIFICATION" for engine coolant concentration. Ref. to COOLING(H4DO)>General Description>SPECIFICATION>ENGINE COOLANT>CONCENTRATION.**
- **Refer to "SPECIFICATION" for engine coolant level. Ref. to COOLING(H4DO)>General Description>SPECIFICATION>ENGINE COOLANT>CAPACITY.**

Preparation items:

Engine coolant: Refer to "SPECIFICATION" for engine coolant. Ref. to COOLING(H4DO)>General Description>SPECIFICATION>ENGINE COOLANT>TYPE.

1. Loosen the drain plug on the hose heater drain.

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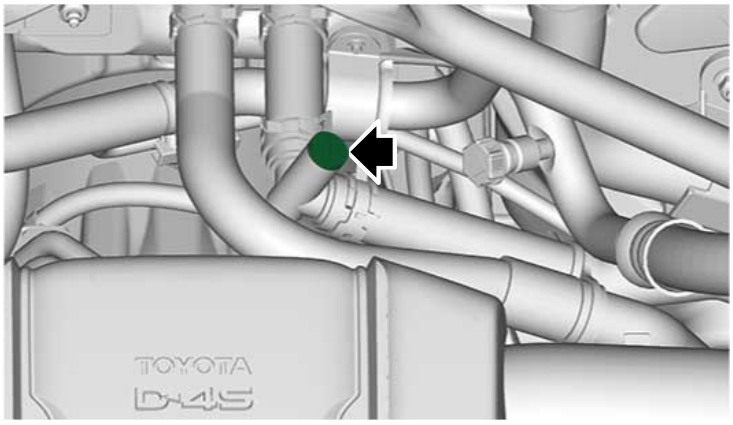


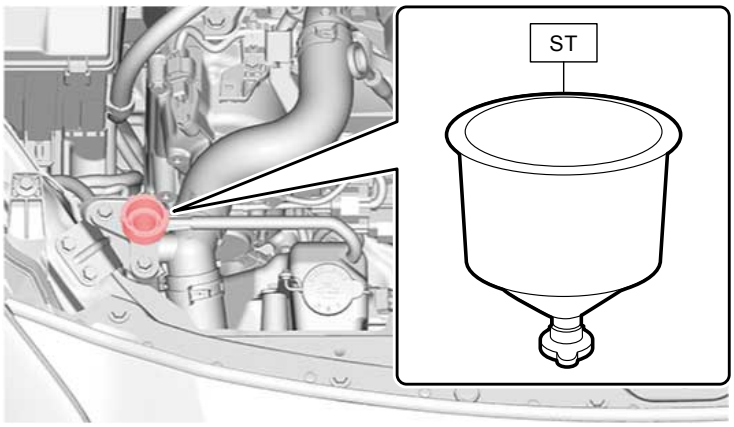
CO-11061

2. Attach the ST to the radiator filler neck.

Preparation tool:

ST: ST COOLANT CHARGER (45099SJ000)

ZD-8AJ



CO-10951

3. Fill the ST with cooling system conditioner.

Preparation items:

Cooling system protective agent: Refer to "SPECIFICATION" for cooling system protective agent. Ref. to COOLING(H4DO)>General Description>SPECIFICATION>ENGINE COOLANT>TYPE.

4. After pouring in the engine coolant through the ST, close the drain plug when the engine coolant comes out of the drain plug on the hose heater drain.
5. Fill engine coolant into the ST.
6. Charge refrigerant. (When the refrigerant has been recollected) Ref. to AIR CONDITIONER>Refrigerant Charging Procedure>PROCEDURE.
7. Start the engine, and race 5 to 6 times at 3,000 r/min or less, then stop the engine.

Note:

Complete this operation within 40 seconds.

8. Wait for one minute after the engine stops. If the engine coolant level drops, add the engine coolant into the ST.
9. Perform the steps 7 and 8 again.
10. Start the engine and operate the A/C at maximum hot position, with the blower speed setting at "LO", and the A/C switch at "OFF".

11. Run the engine at 3,000 r/min or less until the radiator fan starts and then stops.

Caution:

Frequently check the engine coolant temperature in order to avoid overheat.

12. Stop the engine and wait until the engine coolant temperature lowers to 30°C (86°F) or less.
13. If the engine coolant level drops, add the engine coolant into the ST.
14. Keep the A/C setting to maximum hot position, the blower speed setting to "LO", and the A/C switch to "OFF", and start the engine. Perform racing at 3,000 r/min or less. If the flowing sound of engine coolant is heard from the heater core, repeat the procedures from step 11.
15. Stop the engine, remove the ST, and install the radiator cap.

Caution:

Prepare a container and cloth when performing the work in order to prevent scattering of engine coolant. If the oil spills, wipe it off immediately to prevent from penetrating into floor or flowing out for environmental protection.

16. Make sure the engine coolant level in the reservoir tank is between "FULL" and "LOW", and adjust if necessary. Ref. to COOLING(H4DO)>Engine Coolant>INSPECTION > ENGINE COOLANT LEVEL CHECK.

REMOVAL

1. WATER PUMP PULLEY

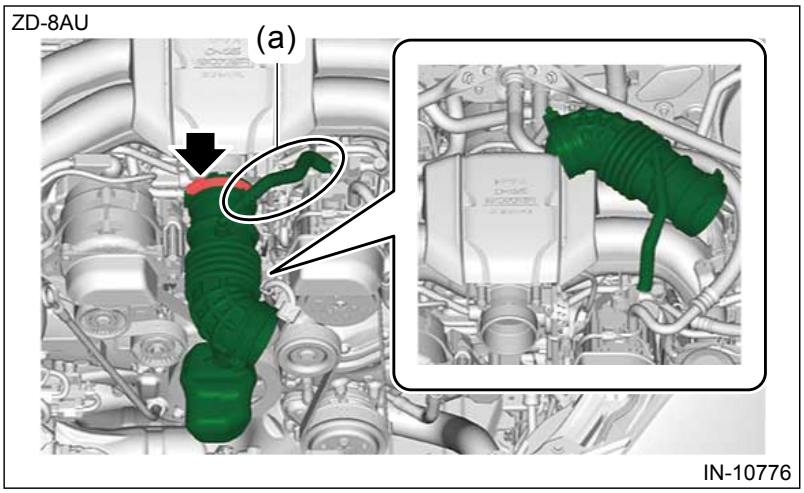
1. Disconnect the ground terminal from battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.
2. Perform the steps below to remove the air intake boot, and place it aside so that it does not interfere with the work.

Caution:
Do not disconnect the PCV hose No. 2 (a).

(1) Remove the air cleaner case. Ref. to INTAKE (INDUCTION)(H4DO)>Air Cleaner Case>REMOVAL.

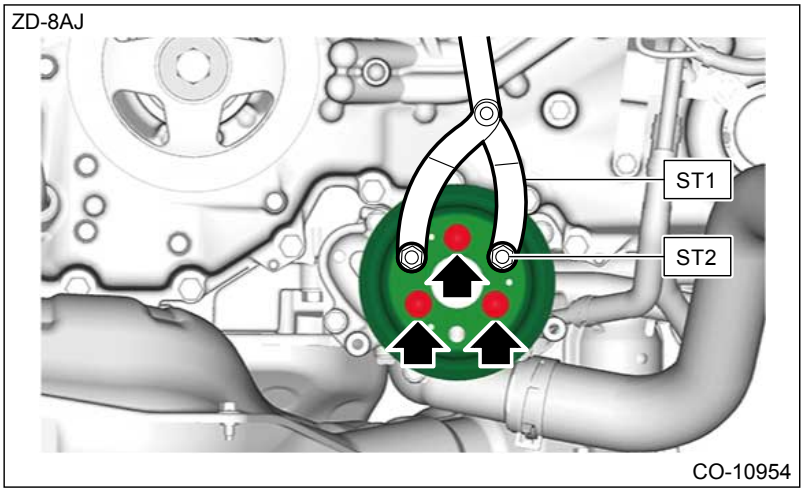
(2) Loosen the clamp, remove the air intake boot, and place it aside so that it does not interfere with the work.

Caution:
Be careful not to pull out the PCV hose No. 2 (a).



3. Remove the V-belts. Ref. to MECHANICAL(H4DO)>V-belt>REMOVAL > V-BELT.
4. Using the ST1 and ST2, remove the water pump pulley.

Preparation tool:
ST1: PULLEY WRENCH (18355AA000)
ST2: PULLEY WRENCH PIN SET (18334AA030)



2. WATER PUMP ASSY

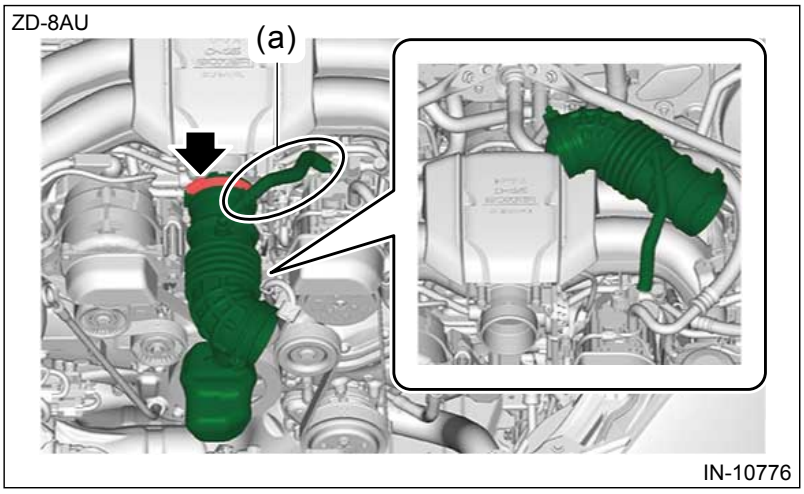
1. Disconnect the ground terminal from battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.
2. Perform the steps below to remove the air intake boot, and place it aside so that it does not interfere with the work.

Caution:
Do not disconnect the PCV hose No. 2 (a).

(1) Remove the air cleaner case. Ref. to INTAKE (INDUCTION)(H4DO)>Air Cleaner Case>REMOVAL.

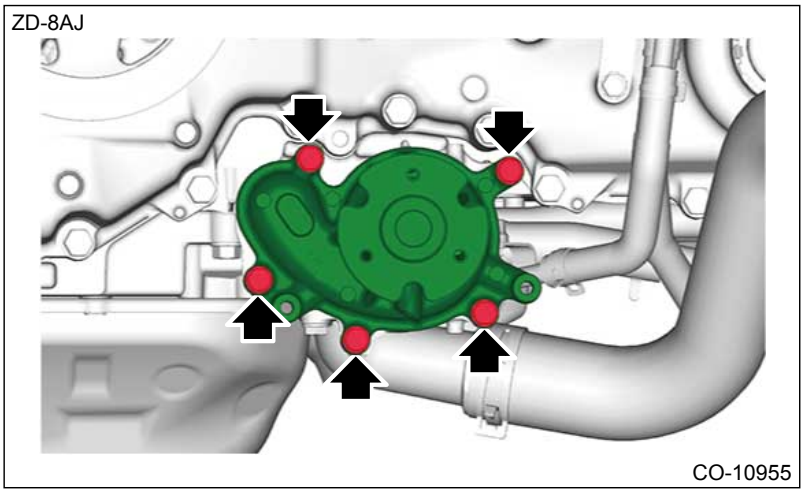
(2) Loosen the clamp, remove the air intake boot, and place it aside so that it does not interfere with the work.

Caution:
Be careful not to pull out the PCV hose No. 2 (a).



3. Remove the water pump pulley. Ref. to COOLING(H4DO)>Water Pump>REMOVAL > WATER PUMP PULLEY.
4. Drain engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT > DRAINING OF ENGINE COOLANT.
5. Remove the front exhaust pipe. Ref. to EXHAUST(H4DO)>Front Exhaust Pipe>REMOVAL > FRONT EXHAUST PIPE.

6. Remove the water pump assembly.



COOLING(H4DO) > Water Pump

INSTALLATION

1. WATER PUMP PULLEY

1. Using the ST1 and ST2, install the water pump pulley.

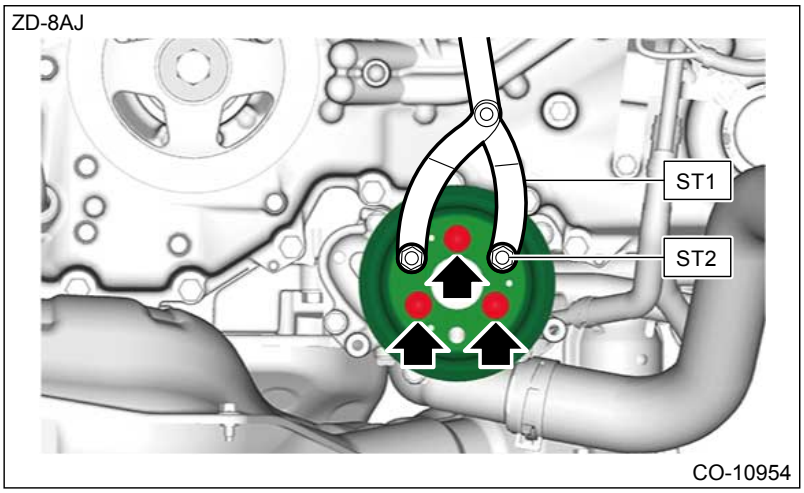
Preparation tool:

ST1: PULLEY WRENCH (18355AA000)

ST2: PULLEY WRENCH PIN SET (18334AA030)

Tightening torque:

14 N·m (1.4 kgf-m, 10.3 ft-lb)



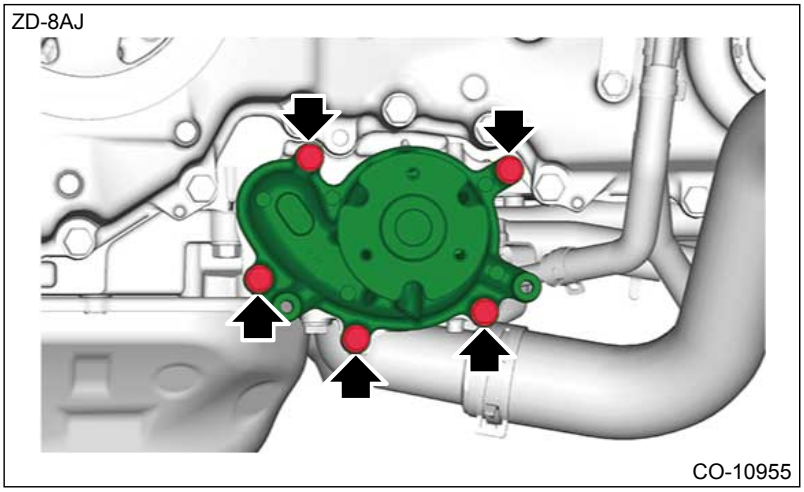
2. Install the V-belts. Ref. to MECHANICAL(H4DO)>V-belt>INSTALLATION > V-BELT.
3. Install the air intake boot. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>INSTALLATION.
4. Connect the ground terminal to battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.

2. WATER PUMP ASSY

1. Install the water pump assembly.

Caution:
Always use a new water pump assembly.

Tightening torque:
6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



2. Install the front exhaust pipe. Ref. to EXHAUST(H4DO)>Front Exhaust Pipe>INSTALLATION > FRONT EXHAUST PIPE.
3. Install the water pump pulley. Ref. to COOLING(H4DO)>Water Pump>INSTALLATION > WATER PUMP PULLEY.
4. Install the air intake boot. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>INSTALLATION.
5. Connect the ground terminal to battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.
6. Fill engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT > FILLING OF ENGINE COOLANT.

COOLING(H4DO) > Water Pump

INSPECTION

1. ENGINE COOLANT LEAKAGE CHECK

Refer to "Engine coolant leakage check" for the inspection procedure. Ref. to COOLING(H4DO)>Engine Coolant>INSPECTION > ENGINE COOLANT LEAKAGE CHECK.

2. OTHER INSPECTIONS

1. Check that there is no deformation, cracks or other damages.
2. Check that the hose has no cracks, damage or loose part.
3. Check the water pump bearing for smooth rotation.

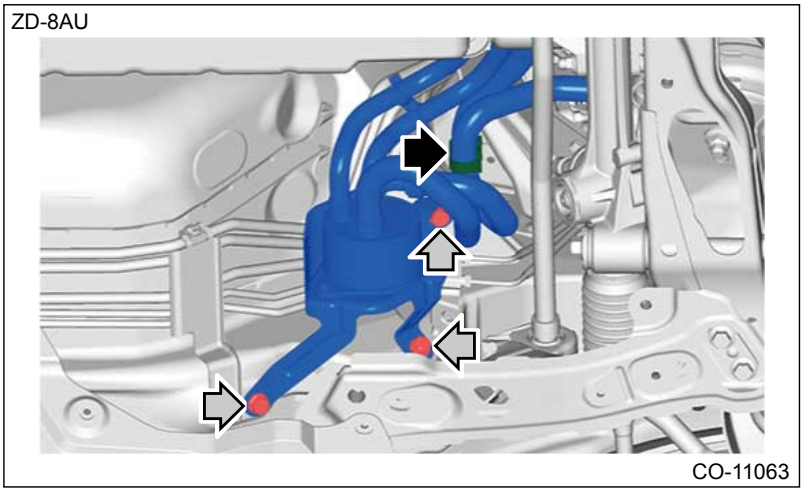
REMOVAL

1. WATER PIPE

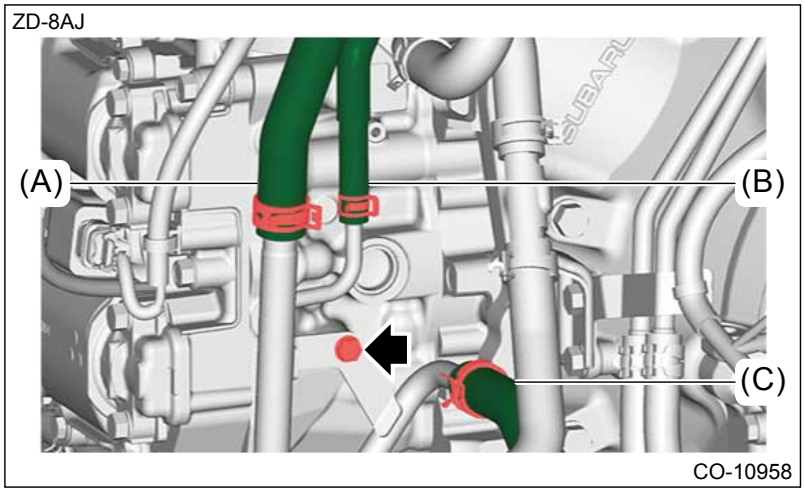
- **AT model**

1. Remove the universal joint assembly steering. Ref. to POWER ASSISTED SYSTEM (POWER STEERING)>Universal Joint>REMOVAL.
2. Disconnect the ground terminal from battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.
3. Drain engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT > DRAINING OF ENGINE COOLANT.
4. Remove the front exhaust pipe. Ref. to EXHAUST(H4DO)>Front Exhaust Pipe>REMOVAL > FRONT EXHAUST PIPE.
5. Remove the sub frame front LWR C COMPL LH. Ref. to FRONT SUSPENSION>Sub Frame>REMOVAL.
6. Remove the clamp from the ATF cooler water hose.
7. Remove the bolts which secure the ATF cooler, and place it aside so that it does not interfere with the work.

Note:
This procedure is necessary to remove the water pipe from the rear side of the vehicle.



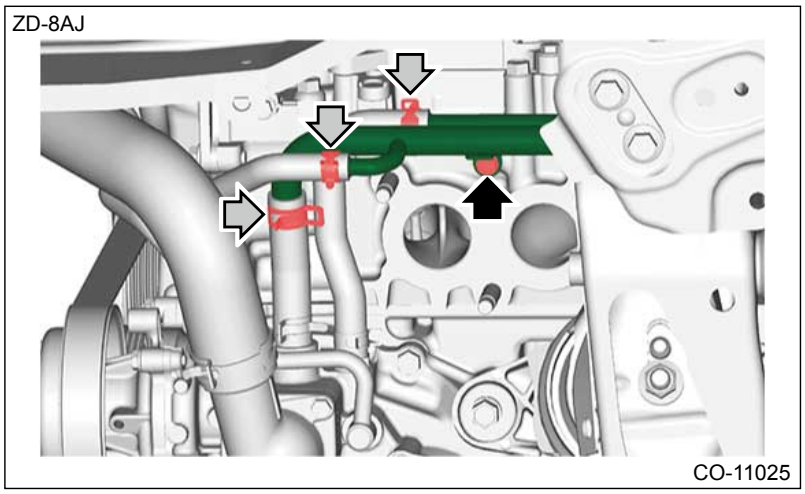
8. Disconnect the heater outlet hose (A), preheater hose (B), and water hose (C) from the water pipe.
9. Remove the bolt securing the water pipe.



10. Remove the bolt securing the water pipe.

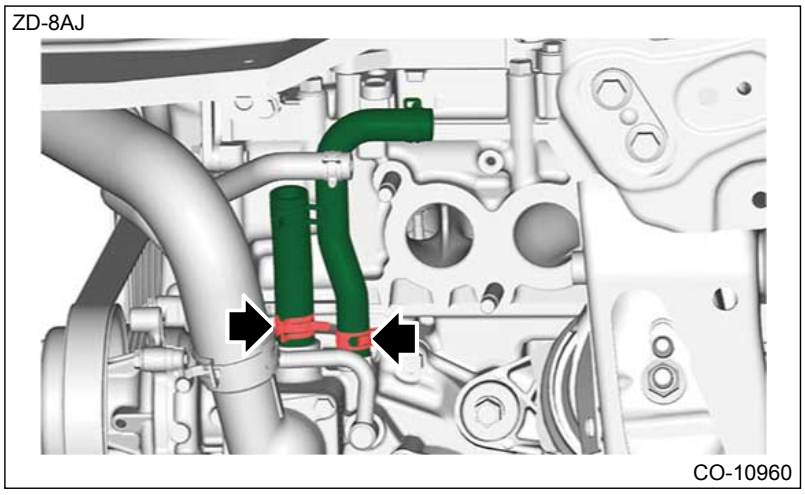
11. Remove the water pipe from each water hose.

Note:
Remove the water pipe from the rear side of the vehicle.



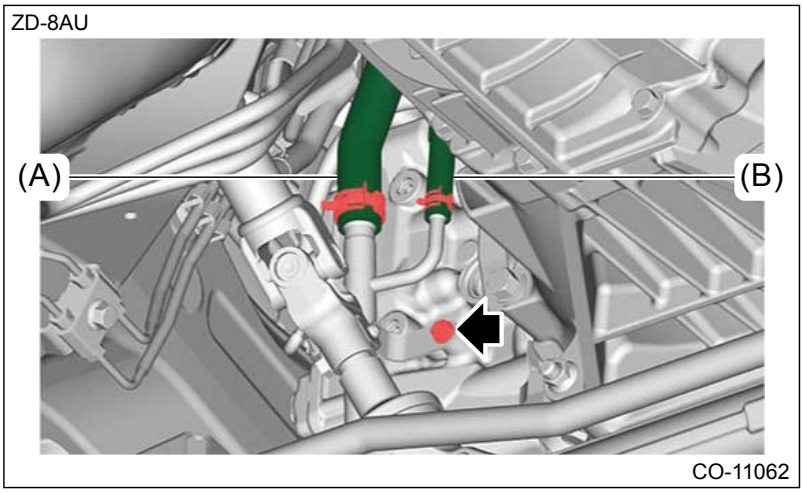
12. Remove each water hose.

Note:
Perform this procedure only when required.



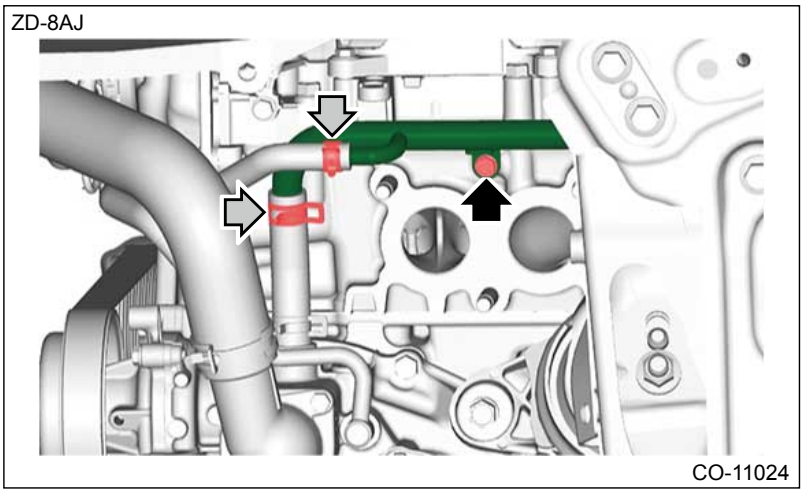
- **MT model**

1. Disconnect the ground terminal from battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.
2. Drain engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT > DRAINING OF ENGINE COOLANT.
3. Remove the front exhaust pipe. Ref. to EXHAUST(H4DO)>Front Exhaust Pipe>REMOVAL > FRONT EXHAUST PIPE.
4. Disconnect the heater outlet hose (A) and preheater hose (B) from the water pipe.
5. Remove the bolt securing the water pipe.



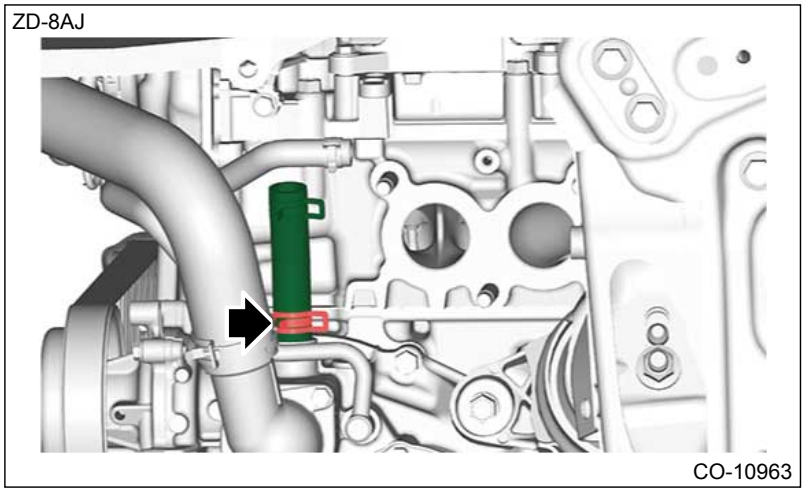
6. Remove the bolt securing the water pipe.
7. Remove the water pipe from each water hose.

Note:
Remove the water pipe from the front side of the vehicle.



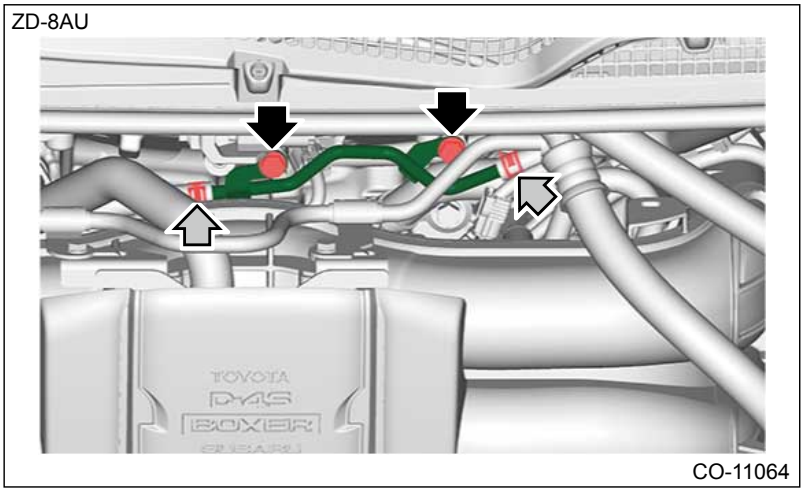
8. Remove the water hose.

Note:
Perform this procedure only when required.



2. PREHEATER PIPE

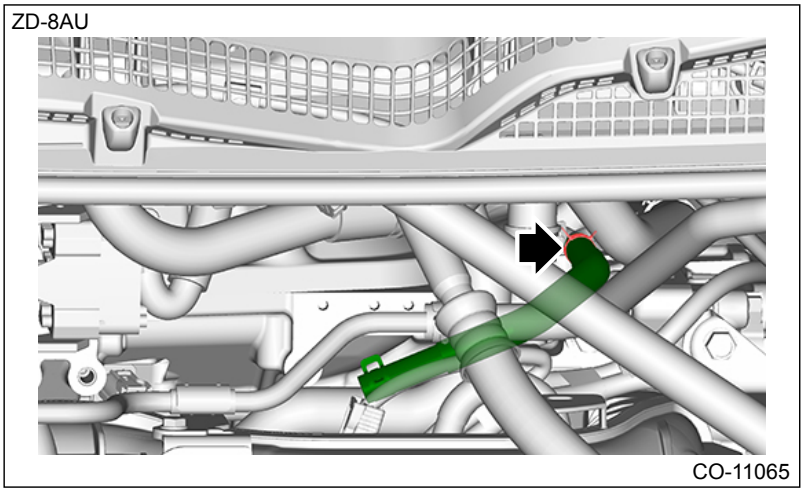
1. Drain engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT > DRAINING OF ENGINE COOLANT.
2. Remove the bolt securing the preheater pipe.
3. Remove the preheater pipe from each preheater hose.



4. Remove each preheater hose.

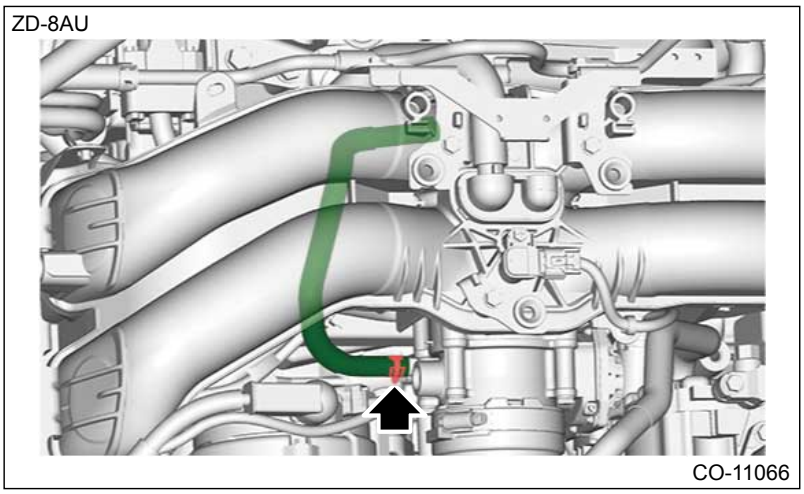
Note:
Perform this procedure only when required.

(1) Remove the preheater hose.



(2) Remove the collector cover. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DO)>Collector Cover>REMOVAL.

(3) Remove the preheater hose.



3. WATER TANK PIPE ASSEMBLY

Caution:
If the engine coolant is spilt over the engine, exhaust pipe or the under cover, completely wipe it off to avoid emission of smoke or causing a fire.

1. Release the fuel pressure. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DO)>Fuel>PROCEDURE > RELEASING OF FUEL PRESSURE.
2. Open the fuel filler lid and remove the fuel filler cap.

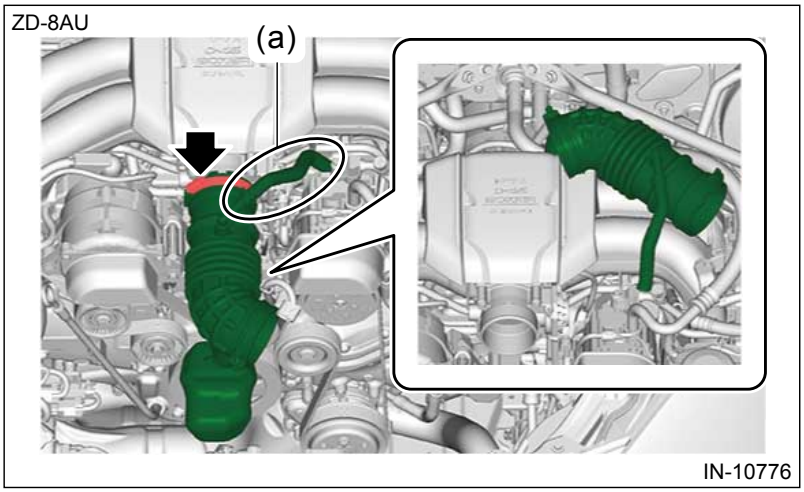
   Note:
   This operation is required to release the inner pressure of the fuel tank.
3. Disconnect the ground terminal from battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.
4. Drain engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT > DRAINING OF ENGINE COOLANT.
5. Perform the steps below to remove the air intake boot, and place it aside so that it does not interfere with the work.

Caution:
Do not disconnect the PCV hose No. 2 (a).

(1) Remove the air cleaner case. Ref. to INTAKE (INDUCTION)(H4DO)>Air Cleaner Case>REMOVAL.

(2) Loosen the clamp, remove the air intake boot, and place it aside so that it does not interfere with the work.

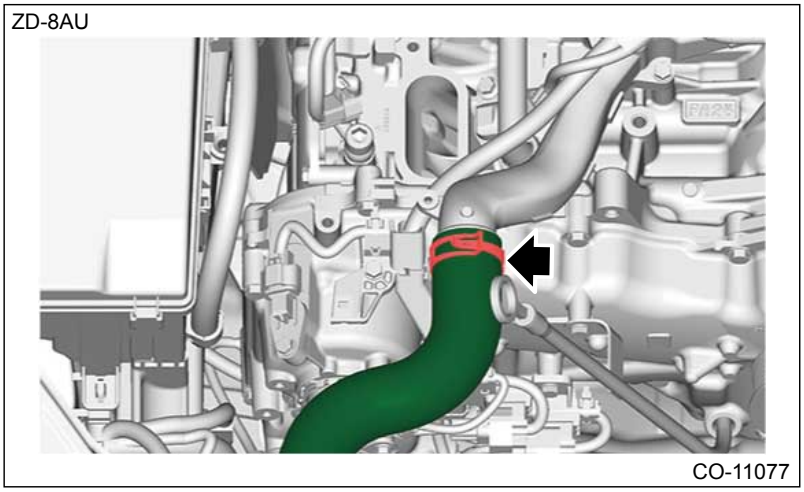
Caution:
Be careful not to pull out the PCV hose No. 2 (a).



6. Remove the high-pressure fuel delivery pipe assembly. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DO)>High Pressure Fuel Delivery Pipe>REMOVAL > HIGH-PRESSURE FUEL DELIVERY PIPE ASSEMBLY.

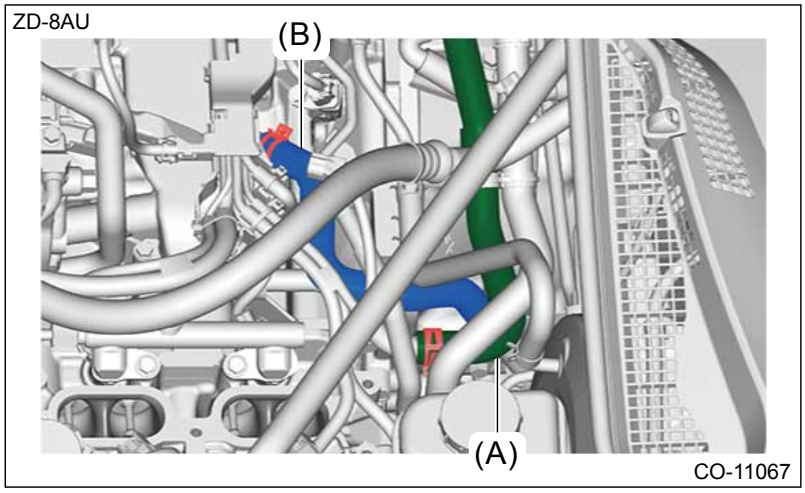
7. Remove the generator and the generator bracket. Ref. to STARTING/CHARGING SYSTEMS(H4DO)>Generator>REMOVAL.

8. Disconnect the radiator inlet hose No. 1.

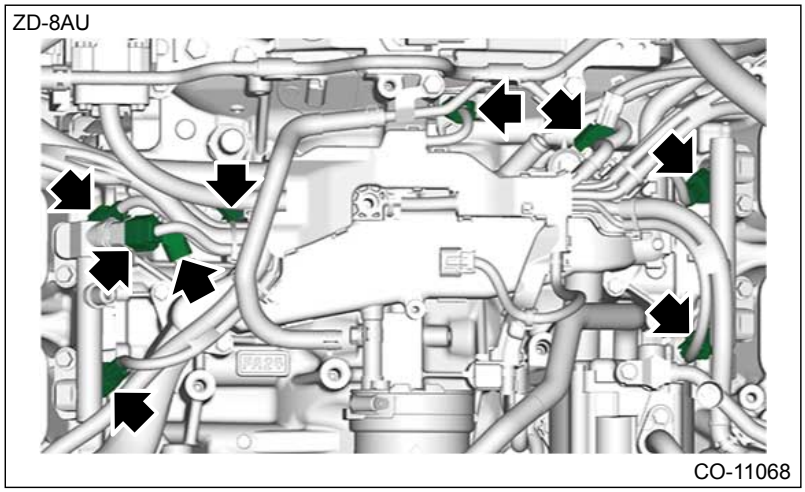


9. Disconnect the heater inlet hose (A).

10. Disconnect the water hose (B). (AT model)

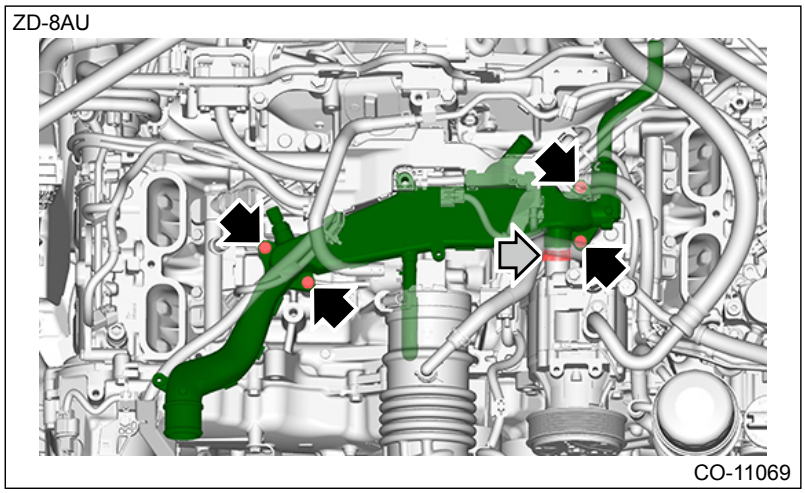


11. Disconnect each connector of the engine wiring harness.



12. Remove the bolts securing the water tank pipe assembly.

13. Remove the water tank pipe assembly from the water hose.



14. Remove each O-ring from the cylinder block.

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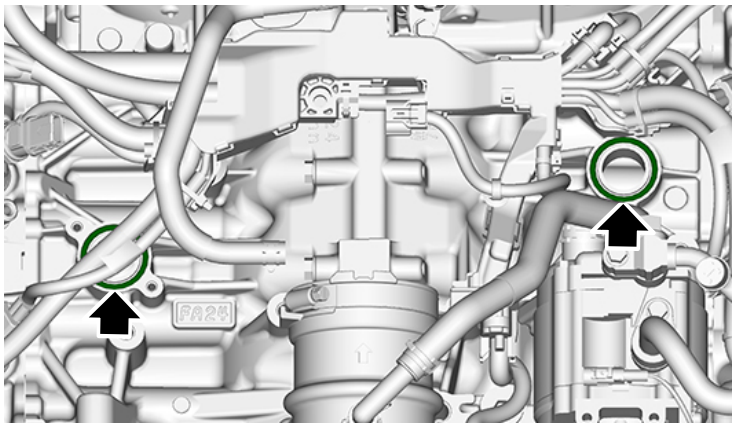


CO-11078

15. Move the A/C compressor if necessary, and then remove the water hose.

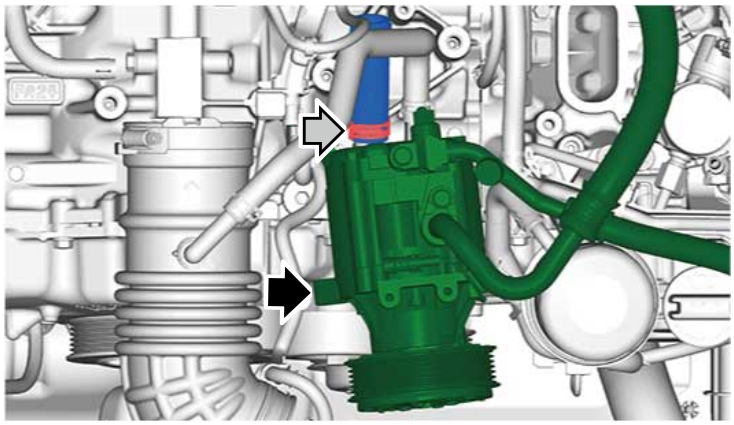
Caution:

- **Do not bend the pipe portion of the hose pressure discharge and the hose pressure suction.**
- **Be careful not to drop the A/C compressor.**
- **Be careful not to damage the adjacent parts with the A/C compressor.**

Note:

Perform this procedure only when required.

ZD-8AU



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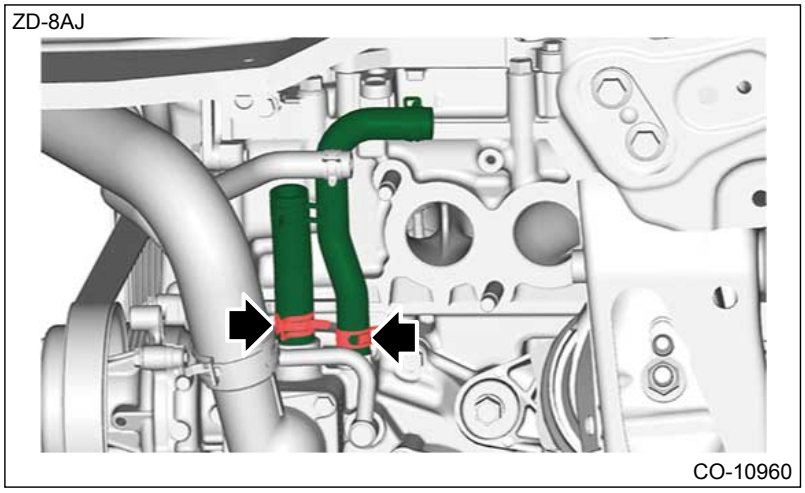
COOLING(H4DO) > Water Pipe

INSTALLATION

1. WATER PIPE

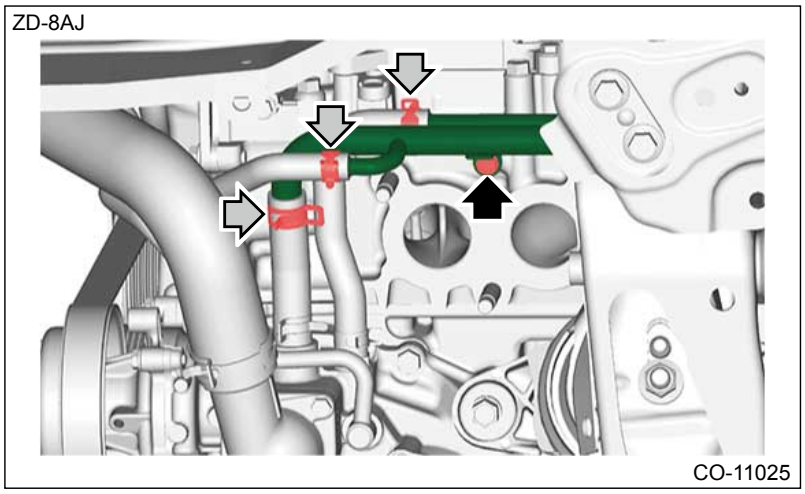
- **AT model**
  1. Install each water hose.



2. Set the water pipe from the rear side of the vehicle, and install the water pipe to each water hose.
3. Install the bolts securing the water pipe.

Tightening torque:

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

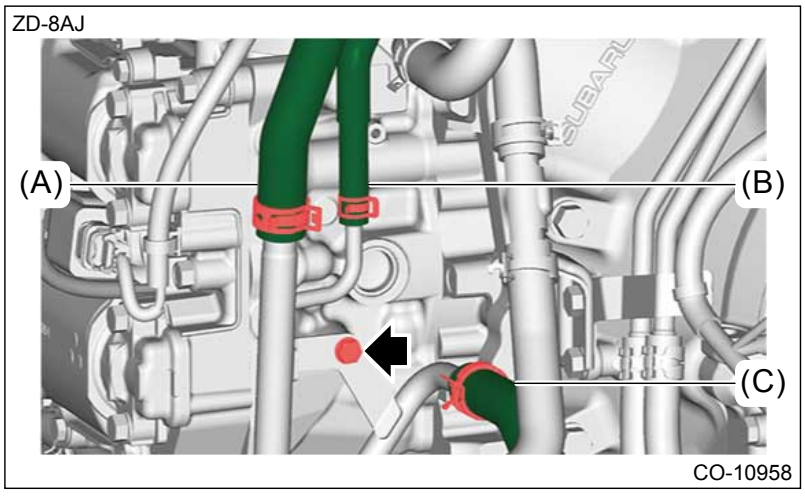


4. Install the bolts securing the water pipe.

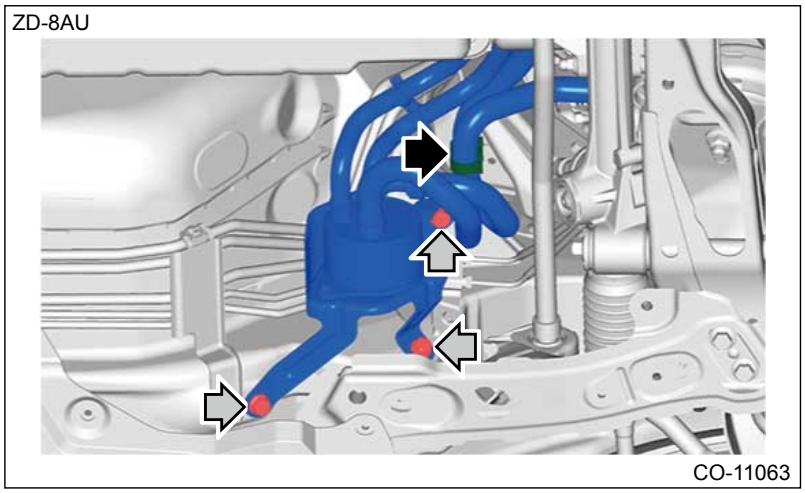
Tightening torque:

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

5. Connect the heater outlet hose (A), preheater hose (B), and water hose (C) to the water pipe.



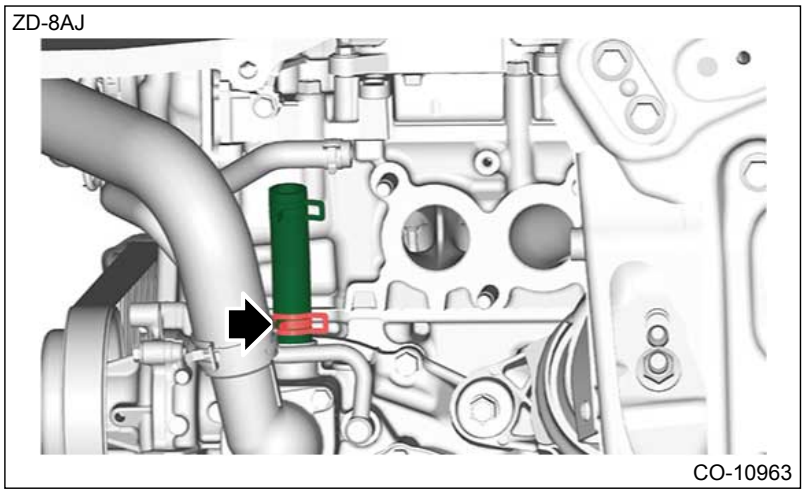
6. Install the ATF cooler. Ref. to AUTOMATIC TRANSMISSION>ATF Cooler (With Warmer Function)>INSTALLATION.
7. Install the clamp to the ATF cooler water hose.



8. Install the sub frame front LWR C COMPL LH. Ref. to FRONT SUSPENSION>Sub Frame>INSTALLATION.
9. Install the front exhaust pipe. Ref. to EXHAUST(H4DO)>Front Exhaust Pipe>INSTALLATION > FRONT EXHAUST PIPE.
10. Connect the ground terminal to battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.
11. Install the universal joint assembly steering. Ref. to POWER ASSISTED SYSTEM (POWER STEERING)>Universal Joint>INSTALLATION.
12. Fill engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT > FILLING OF ENGINE COOLANT.

- **MT model**

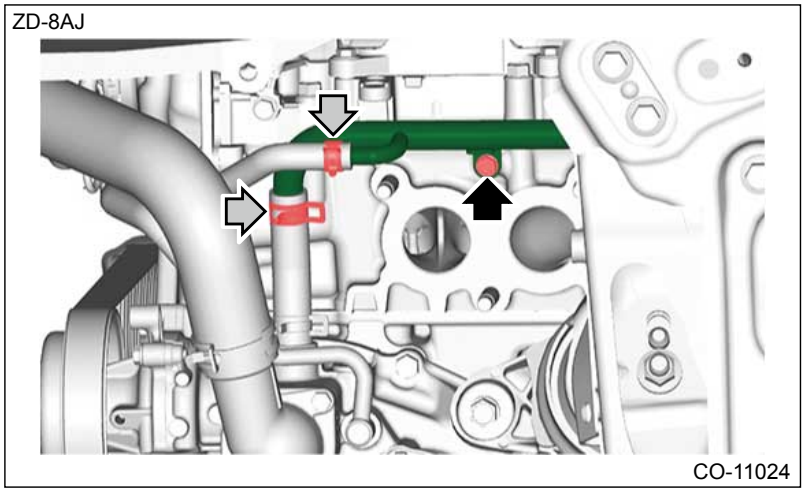
1. Install the water hose.



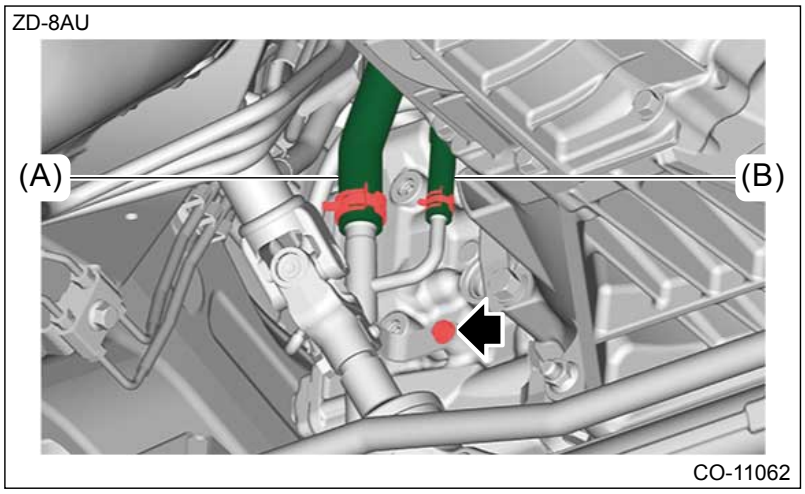
2. Set the water pipe from the front side of the vehicle, and install the water pipe to each water hose.
3. Install the bolts securing the water pipe.

Tightening torque:

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



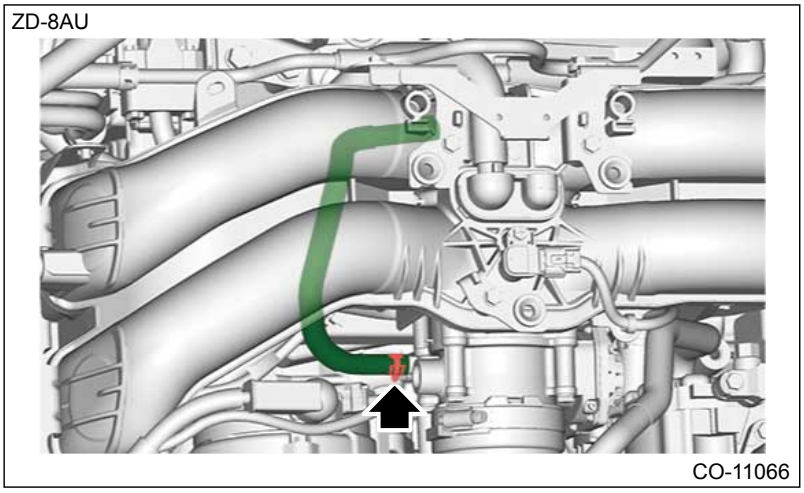
4. Install the bolts securing the water pipe.
   Tightening torque:
   6.4 N·m (0.7 kgf-m, 4.7 ft-lb)
5. Connect the heater outlet hose (A) and preheater hose (B) to the water pipe.



6. Install the front exhaust pipe. Ref. to EXHAUST(H4DO)>Front Exhaust Pipe>INSTALLATION > FRONT EXHAUST PIPE.
7. Connect the ground terminal to battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.
8. Fill engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT > FILLING OF ENGINE COOLANT.

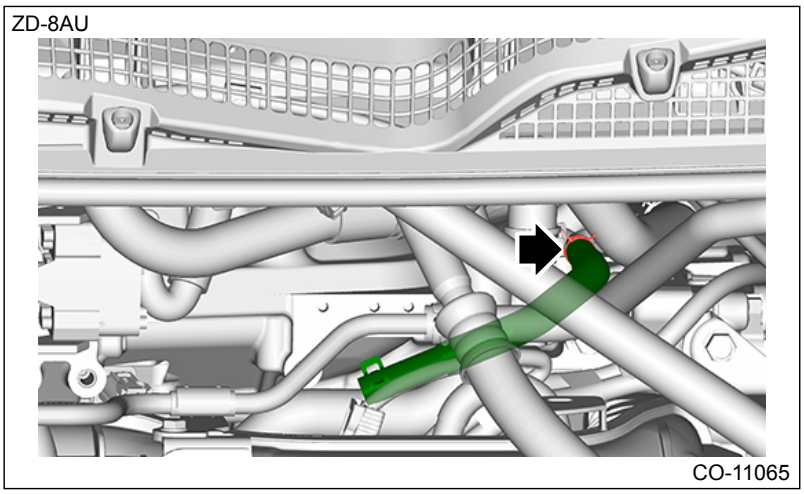
2. PREHEATER PIPE

1. Install each preheater hose.
   (1) Install the preheater hose.



(2) Install the collector cover. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DO)>Collector Cover>INSTALLATION.

(3) Install the preheater hose.

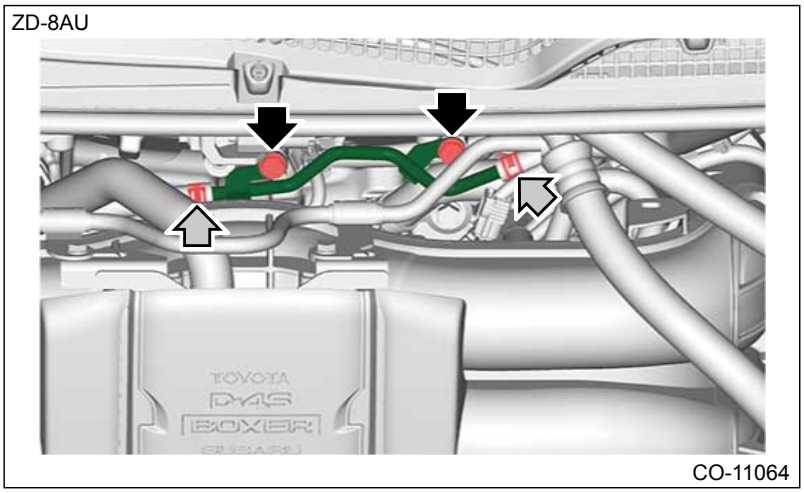


2. Install the preheater pipe to each preheater hose.

3. Install the bolts securing the preheater pipe.

Tightening torque:

19 N·m (1.9 kgf-m, 14.0 ft-lb)



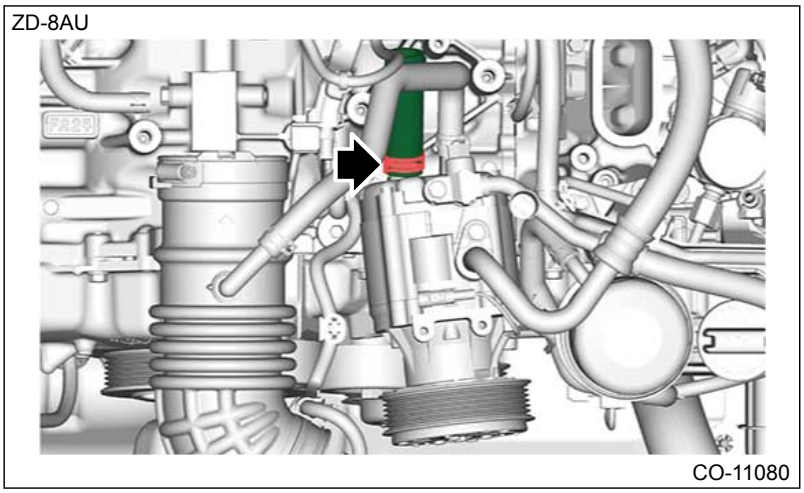
4. Fill engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT > FILLING OF

ENGINE COOLANT.

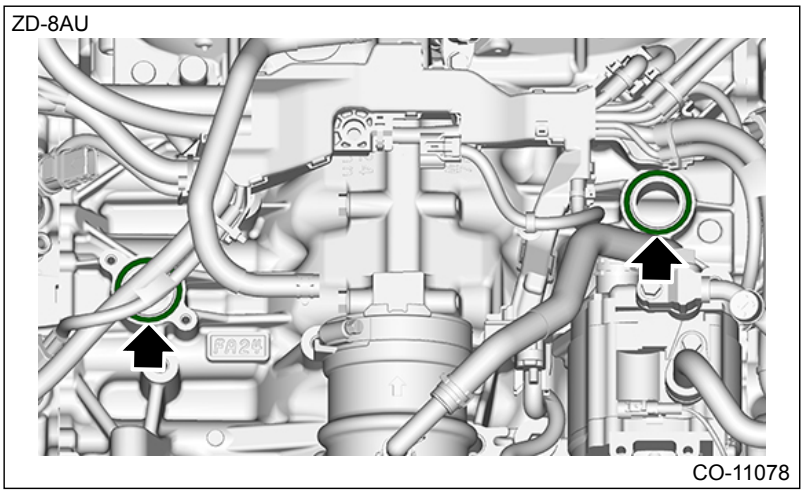
3. WATER TANK PIPE ASSEMBLY

Caution:
If the engine coolant is spilt over the engine, exhaust pipe or the under cover, completely wipe it off to avoid emission of smoke or causing a fire.

1. Install the water hose.



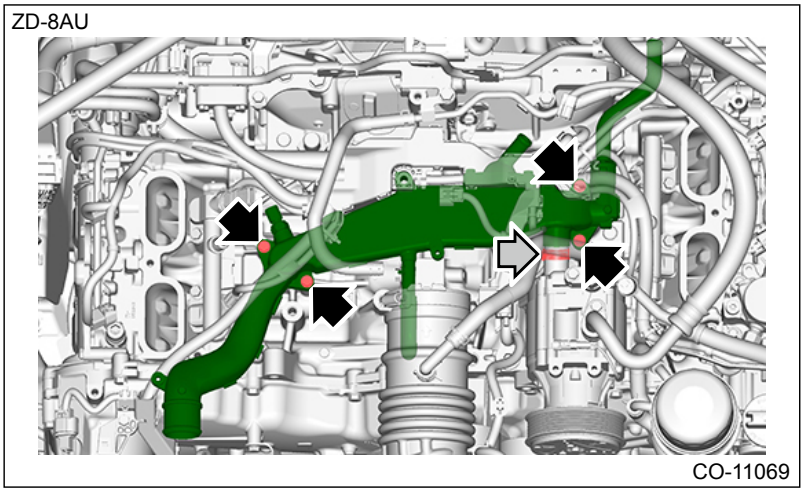
2. Install each new O-ring to the cylinder block.



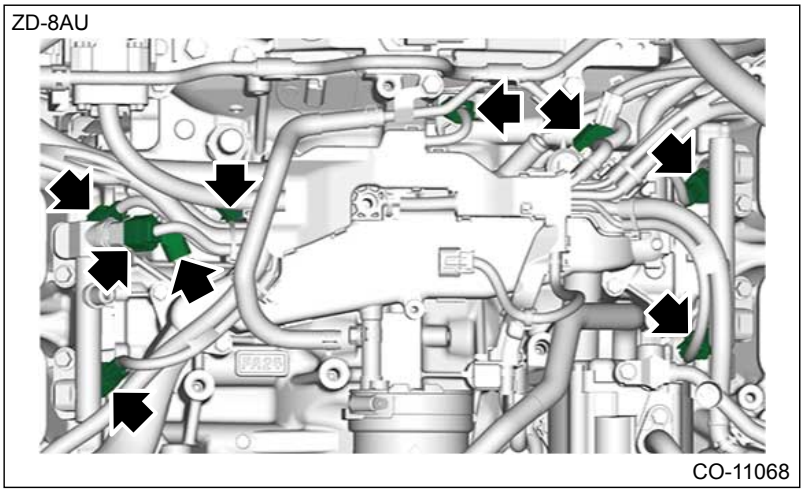
3. Install the water tank pipe assembly to the water hose.
4. Install the bolts securing the water tank pipe assembly.

Tightening torque:

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

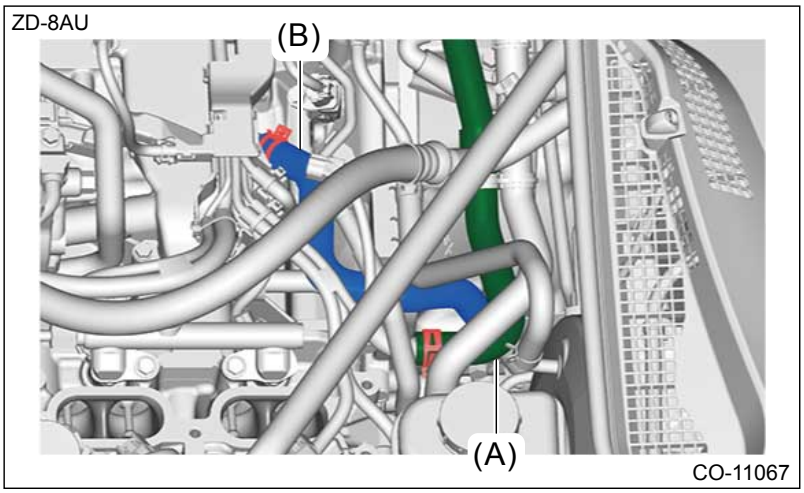


5. Connect each connector of the engine wiring harness.

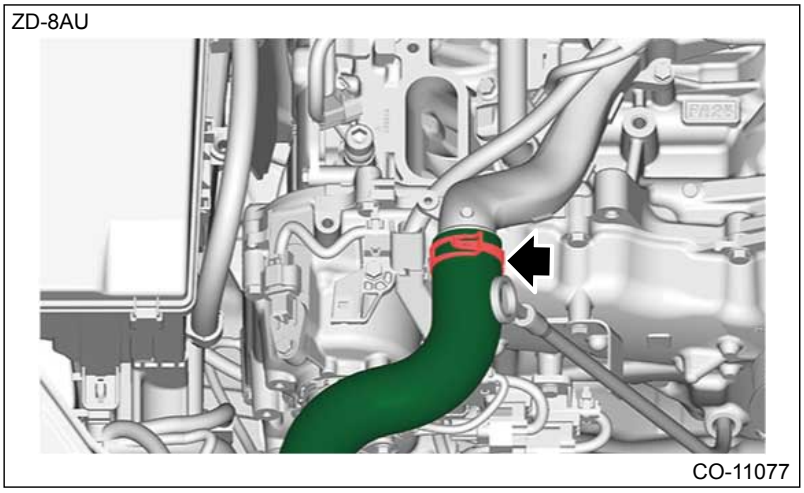


6. Connect the heater inlet hose (A).

7. Connect the water hose (B). (AT model)



8. Connect the radiator inlet hose No. 1.



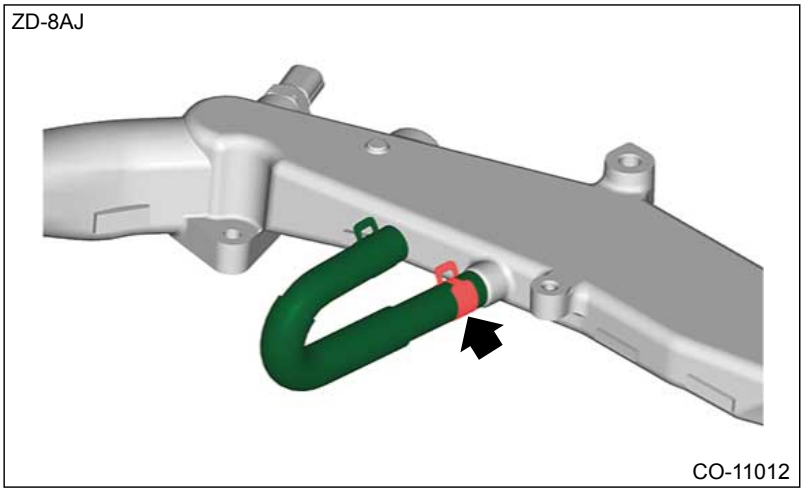
9. Install the generator bracket and the generator. Ref. to STARTING/CHARGING SYSTEMS(H4DO)>Generator>INSTALLATION.
10. Install the high-pressure fuel delivery pipe assembly. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DO)>High Pressure Fuel Delivery Pipe>INSTALLATION > HIGH-PRESSURE FUEL DELIVERY PIPE ASSEMBLY.
11. Install the air intake boot. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>INSTALLATION.
12. Connect the ground terminal to battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.
13. Install the fuel filler cap, and close the fuel filler lid.
14. Fill engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT > FILLING OF ENGINE COOLANT.
15. Check refrigerant leaks. Ref. to AIR CONDITIONER>Refrigerant Leak Check>INSPECTION.

COOLING(H4DO) > Water Pipe

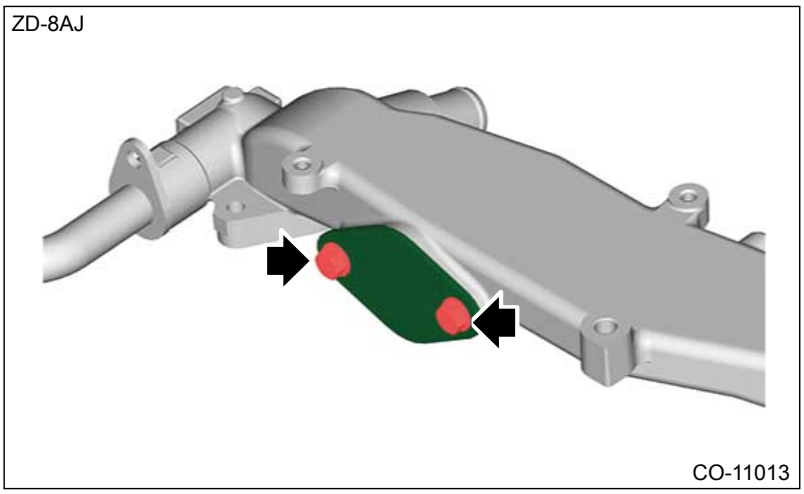
DISASSEMBLY

1. WATER TANK PIPE ASSEMBLY

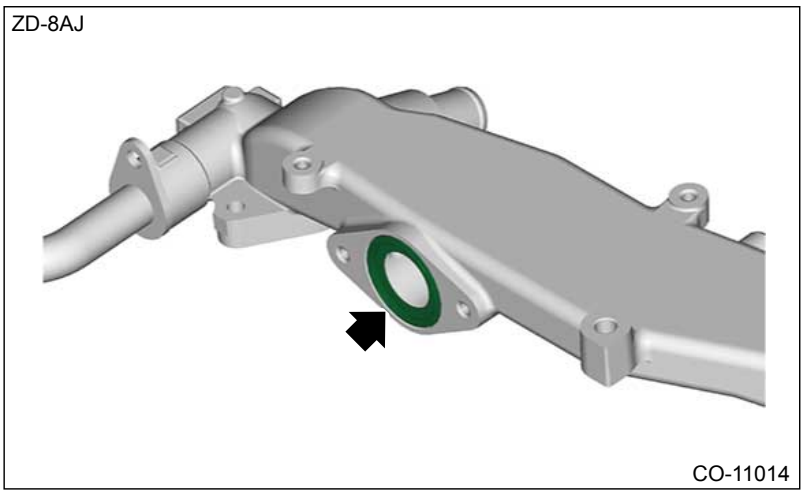
1. Remove the preheater hose.



2. Remove the thermostat. (AT model) Ref. to COOLING(H4DO)>Thermostat>REMOVAL > WATER TANK PIPE SIDE.
3. Remove the cover. (MT model)



4. Remove the gasket. (MT model)



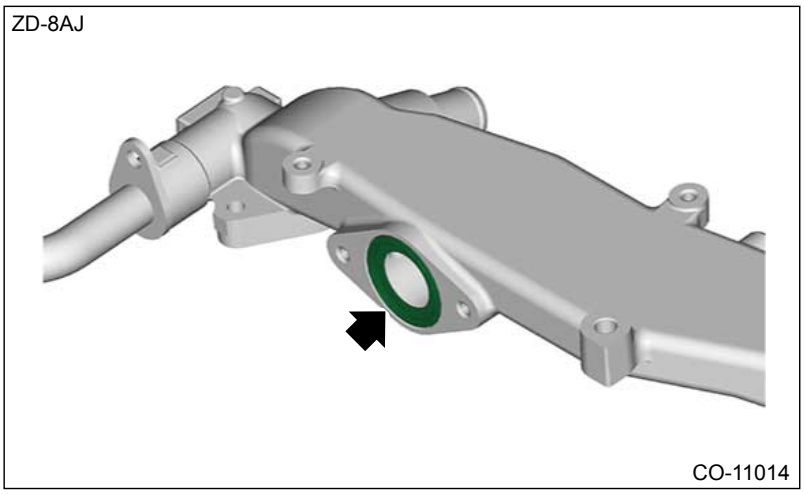
5. Remove the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DO)>Engine Coolant Temperature Sensor>REMOVAL.

COOLING(H4DO) > Water Pipe

ASSEMBLY

1. WATER TANK PIPE ASSEMBLY

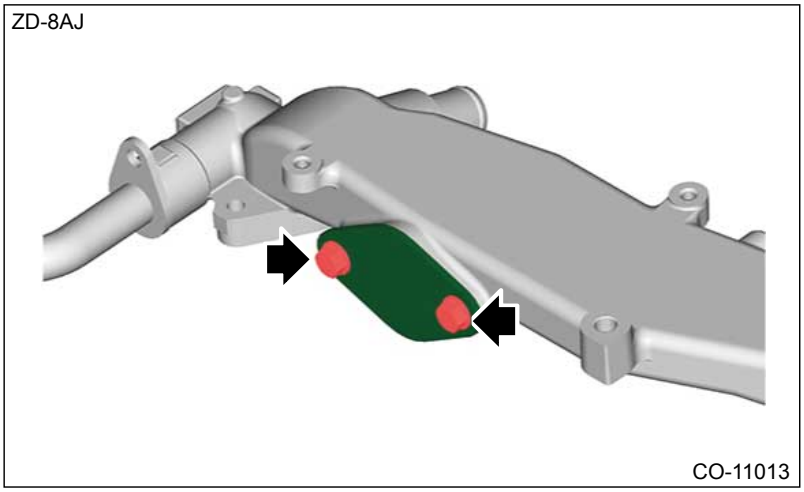
1. Install the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DO)>Engine Coolant Temperature Sensor>INSTALLATION.
2. Install the thermostat. (AT model) Ref. to COOLING(H4DO)>Thermostat>INSTALLATION > WATER TANK PIPE SIDE.
3. Install a new gasket. (MT model)



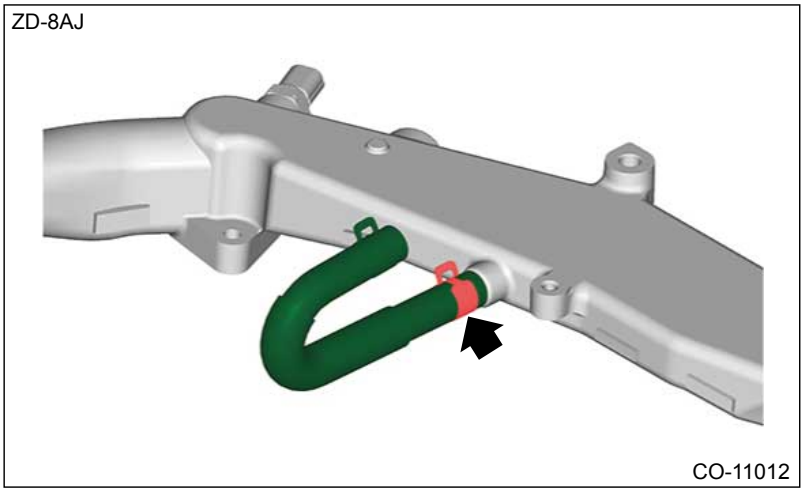
4. Install the cover. (MT model)

   Tightening torque:

   6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



5. Install the preheater hose.



COOLING(H4DO) > Water Pipe

INSPECTION

1. ENGINE COOLANT LEAKAGE CHECK

Refer to “Engine coolant leakage check” for the inspection procedure. Ref. to COOLING(H4DO)>Engine Coolant>INSPECTION > ENGINE COOLANT LEAKAGE CHECK.

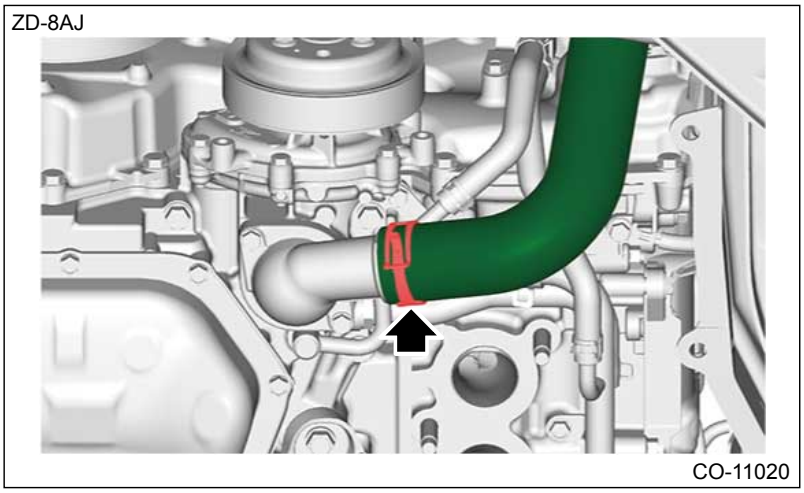
2. OTHER INSPECTIONS

1. Check that there is no deformation, cracks or other damages.
2. Check that the hose has no cracks, damage or loose part.

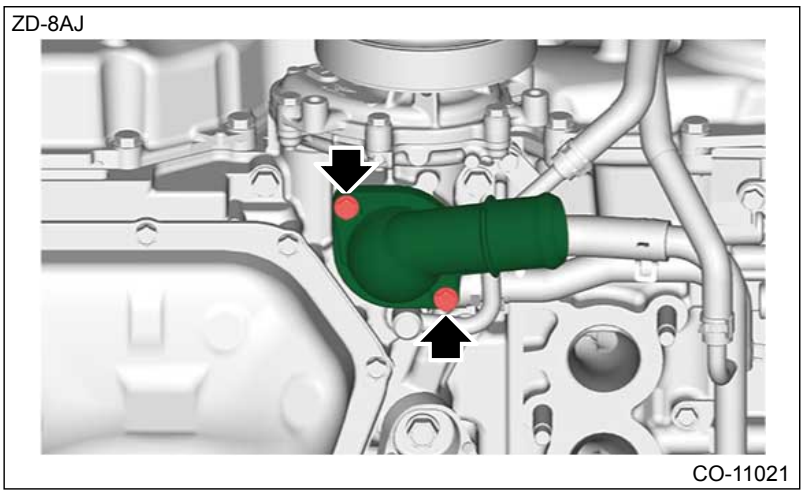
REMOVAL

1. ENGINE SIDE

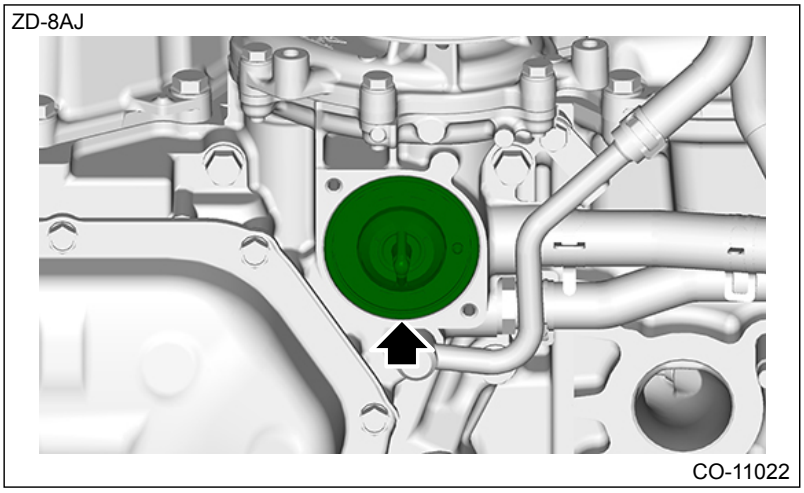
1. Disconnect the ground terminal from battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.
2. Drain engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT > DRAINING OF ENGINE COOLANT.
3. Remove the front exhaust pipe. Ref. to EXHAUST(H4DO)>Front Exhaust Pipe>REMOVAL > FRONT EXHAUST PIPE.
4. Disconnect radiator outlet hose.



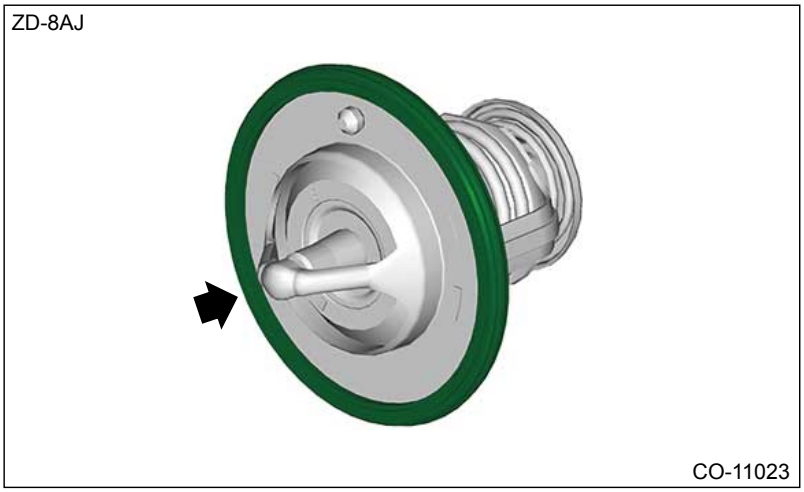
5. Remove the thermostat cover.



6. Remove the thermostat.



7. Remove the gasket from thermostat.



2. WATER TANK PIPE SIDE

Note:
The water tank pipe side is installed on AT models only.

1. Release the fuel pressure. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DO)>Fuel>PROCEDURE > RELEASING OF FUEL PRESSURE.

2. Open the fuel filler lid and remove the fuel filler cap.

Note:
This operation is required to release the inner pressure of the fuel tank.

3. Disconnect the ground terminal from battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.

4. Drain engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT > DRAINING OF ENGINE COOLANT.

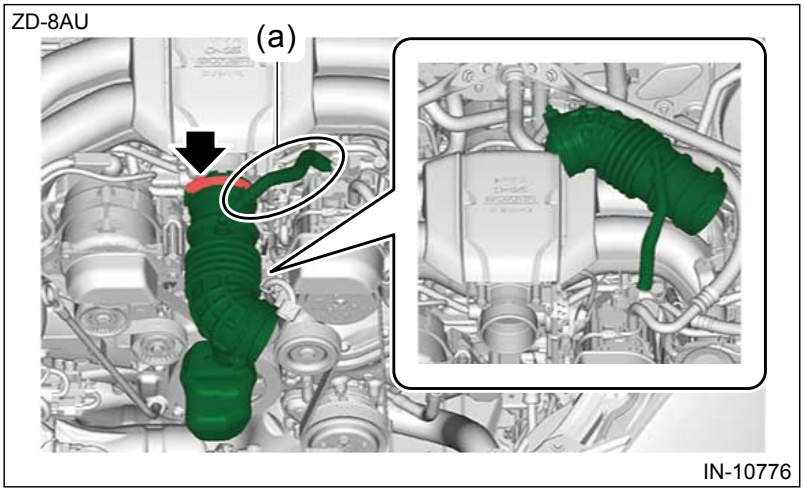
5. Perform the steps below to remove the air intake boot, and place it aside so that it does not interfere with the work.

Caution:
Do not disconnect the PCV hose No. 2 (a).

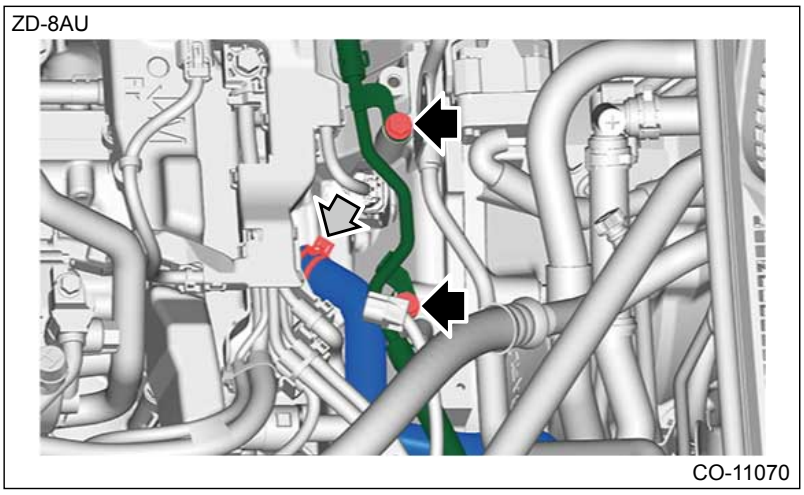
(1) Remove the air cleaner case. Ref. to INTAKE (INDUCTION)(H4DO)>Air Cleaner Case>REMOVAL.

(2) Loosen the clamp, remove the air intake boot, and place it aside so that it does not interfere with the work.

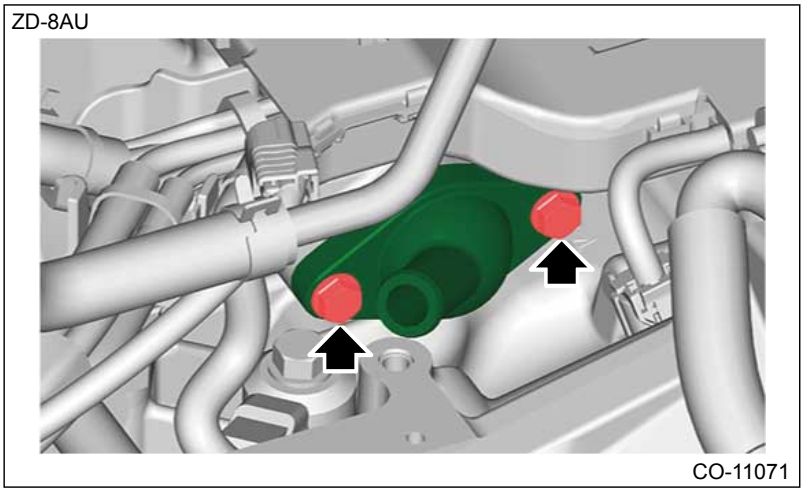
Caution:
Be careful not to pull out the PCV hose No. 2 (a).



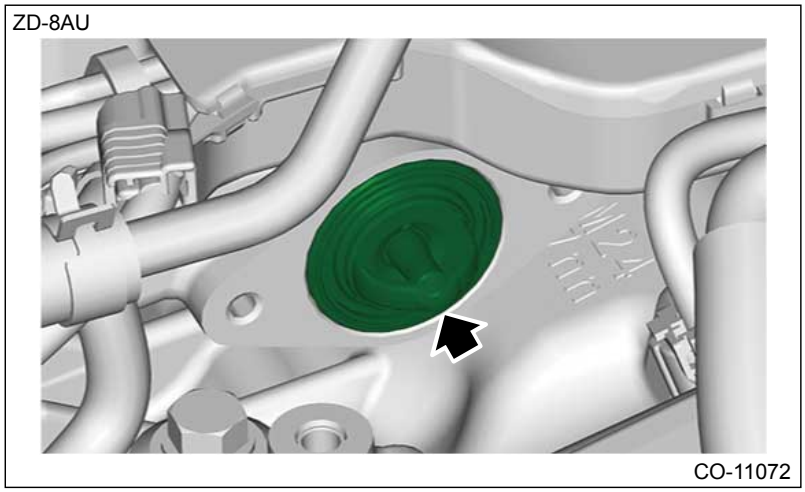
6. Remove the intake manifold assembly. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DO)>Intake Manifold Assembly>REMOVAL.
7. Remove the bolt securing the preheater pipe, and place it aside so that it does not interfere with the work.
8. Disconnect the water hoses.



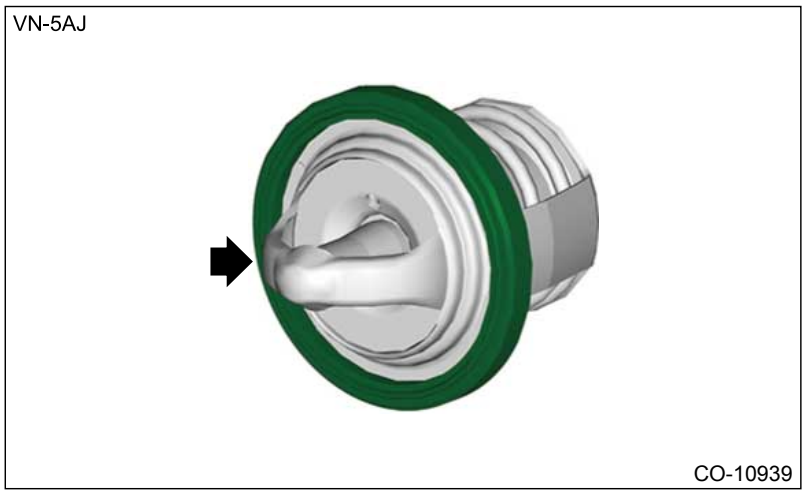
9. Remove the thermostat cover.



10. Remove the thermostat.



11. Remove the gasket from thermostat.

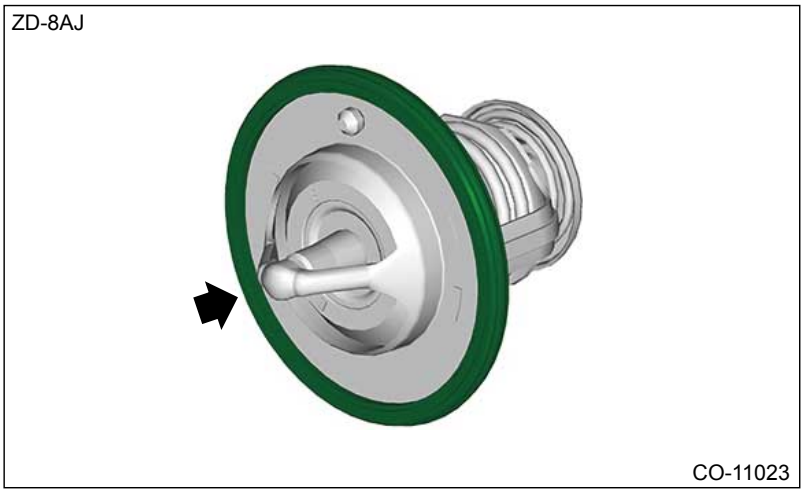


COOLING(H4DO) > Thermostat

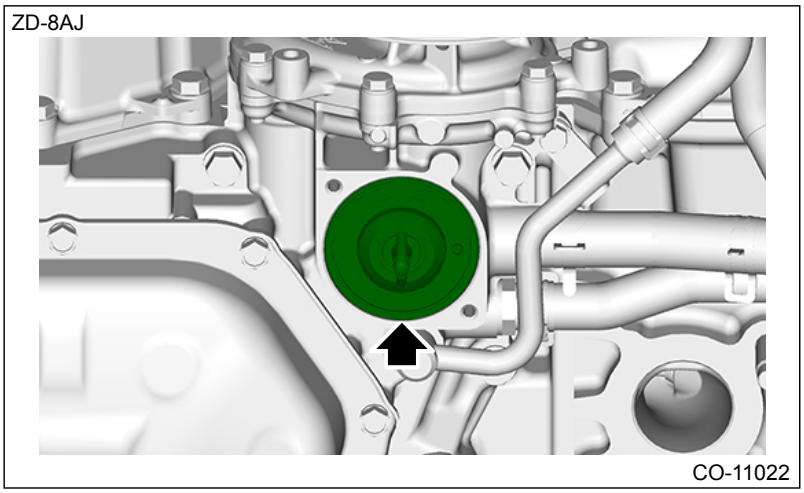
INSTALLATION

1. ENGINE SIDE

1. Install a new gasket to the thermostat.



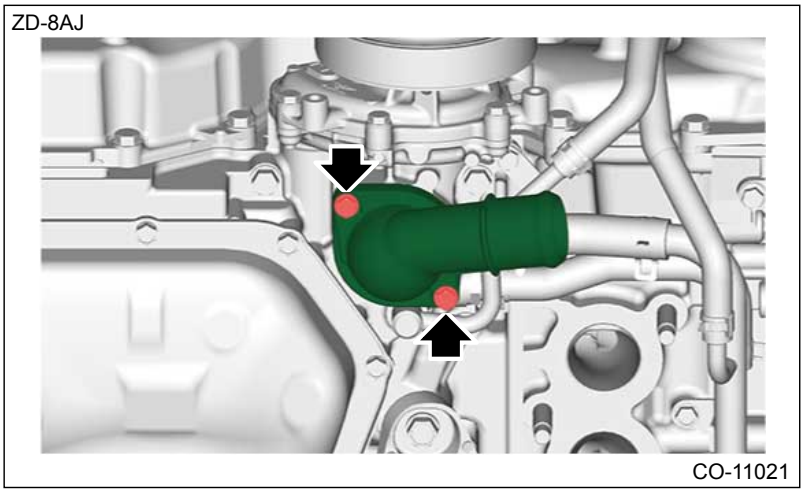
2. Install the thermostat.



3. Install the thermostat cover.

Tightening torque:

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



4. Connect the radiator outlet hose.

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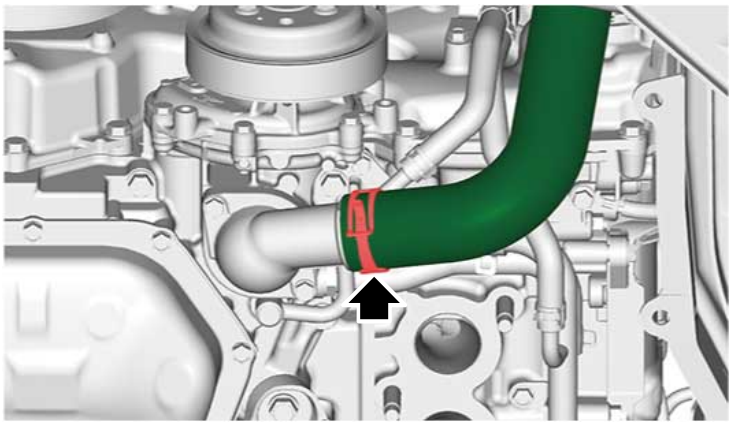


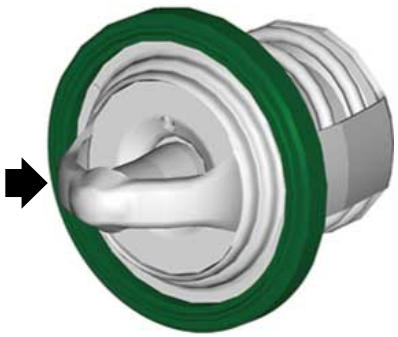
CO-11020

5. Install the front exhaust pipe. Ref. to EXHAUST(H4DO)>Front Exhaust Pipe>INSTALLATION > FRONT EXHAUST PIPE.
6. Connect the ground terminal to battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.
7. Fill engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT > FILLING OF ENGINE COOLANT.

2. WATER TANK PIPE SIDE

1. Install a new gasket to the thermostat.

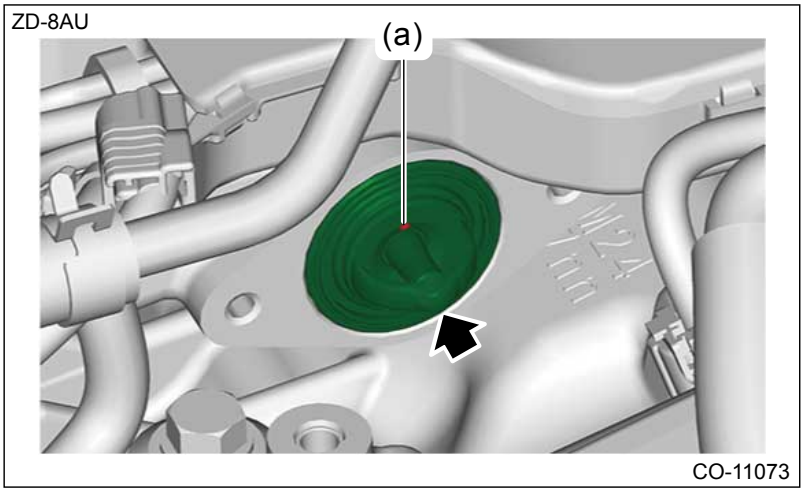
VN-5AJ



CO-10939

2. Install the thermostat.

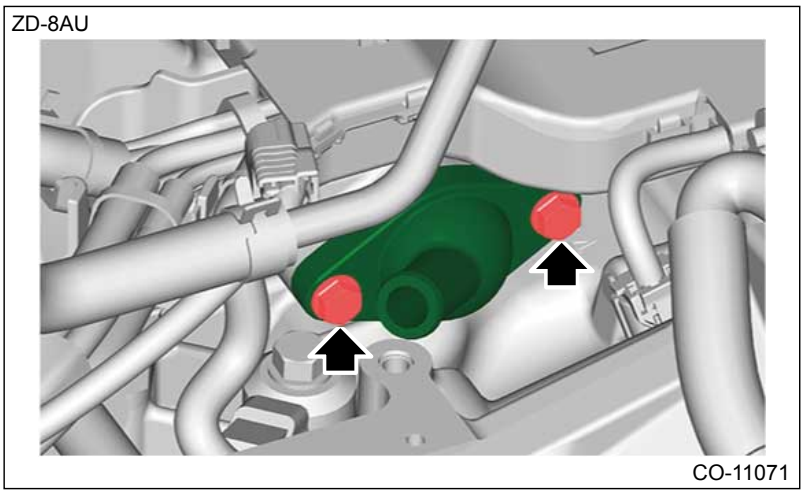
Note:
When installed, the air vent hole (a) should face upward.



3. Install the thermostat cover.

Tightening torque:

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

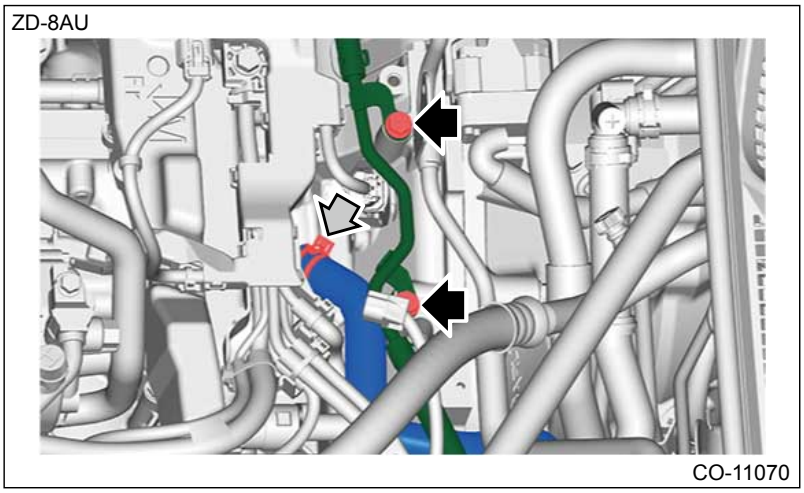


4. Connect the water hose.

5. Install the preheater pipe.

Tightening torque:

19 N·m (1.9 kgf-m, 14.0 ft-lb)



6. Install the intake manifold assembly. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DO)>Intake

Manifold Assembly>INSTALLATION.

7. Install the air intake boot. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>INSTALLATION.
8. Connect the ground terminal to battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.
9. Install the fuel filler cap, and close the fuel filler lid.
10. Fill engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT > FILLING OF ENGINE COOLANT.
11. Check refrigerant leaks. Ref. to AIR CONDITIONER>Refrigerant Leak Check>INSPECTION.

COOLING(H4DO) > Thermostat

INSPECTION

1. ENGINE COOLANT LEAKAGE CHECK

Refer to "Engine coolant leakage check" for the inspection procedure. Ref. to COOLING(H4DO)>Engine Coolant>INSPECTION > ENGINE COOLANT LEAKAGE CHECK.

2. CHECK THERMOSTAT

1. Check that the thermostat valve closes completely at an ambient temperature.
2. Immerse the thermostat and a thermometer in water. Raise water temperature gradually, and check the temperature and the valve lift amount when the valve begins to open and when the valve is fully opened. Replace the thermostat if faulty.

Note:

- **During the test, agitate the water for even temperature distribution.**
- **Leave the thermostat in the boiling water for five minutes or more before measuring the valve lift.**
- **Hold the thermostat with a wire or the like to avoid contacting with container bottom.**

Starting temperature to open:

Engine side

86 — 90 °C(187 — 194 °F)

Water tank pipe side

48 — 52 °C (118 — 126 °F)

Full open temperature:

Engine side

95°C (203°F)

Water tank pipe side

63°C (145°F)

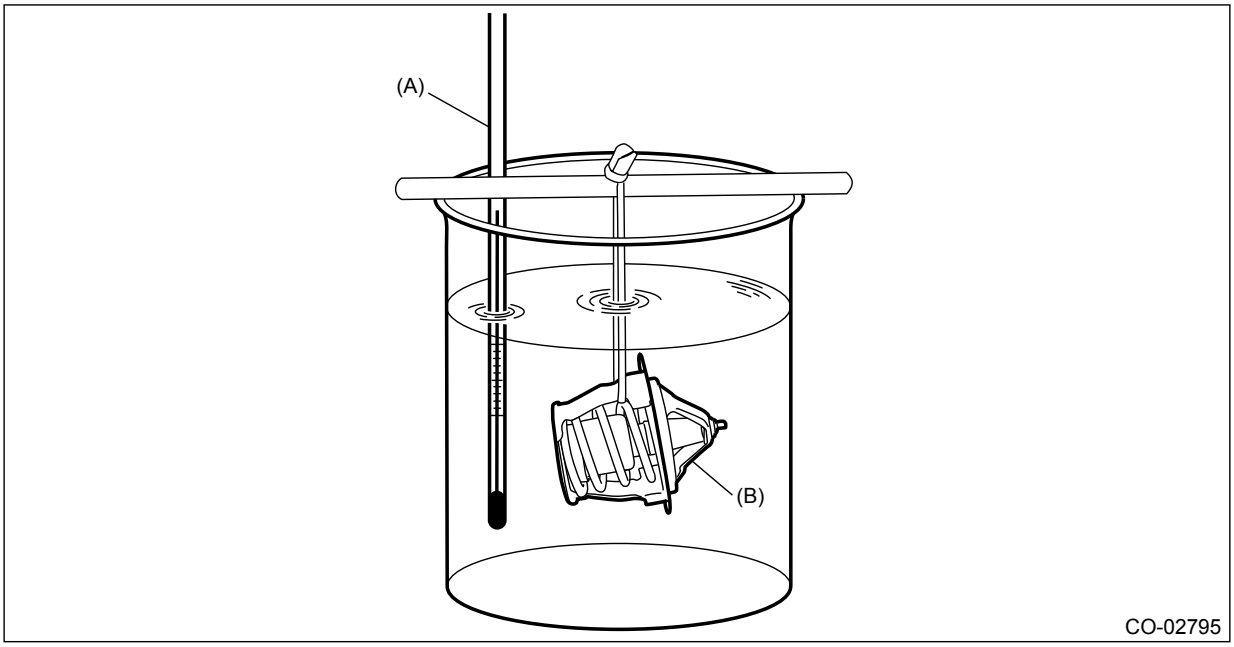
Total valve lift:

Engine side

8.0 mm (0.315 in) or more

Water tank pipe side

6.0 mm (0.236 in) or more



(A) Thermometer (B) Thermostat

3. OTHER INSPECTIONS

1. Check that there is no deformation, cracks or other damages.
2. Check that the hose has no cracks, damage or loose part.

REMOVAL

Caution:

- **The engine coolant is pressurized when it is hot. Wait until engine coolant cools down before proceeding the work.**
- **If the engine coolant is spilt over the engine, exhaust pipe or the under cover, completely wipe it off to avoid emission of smoke or causing a fire.**

1. Disconnect the ground terminal from battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.
2. Collect the refrigerant. Ref. to AIR CONDITIONER>Refrigerant Recovery Procedure>PROCEDURE.

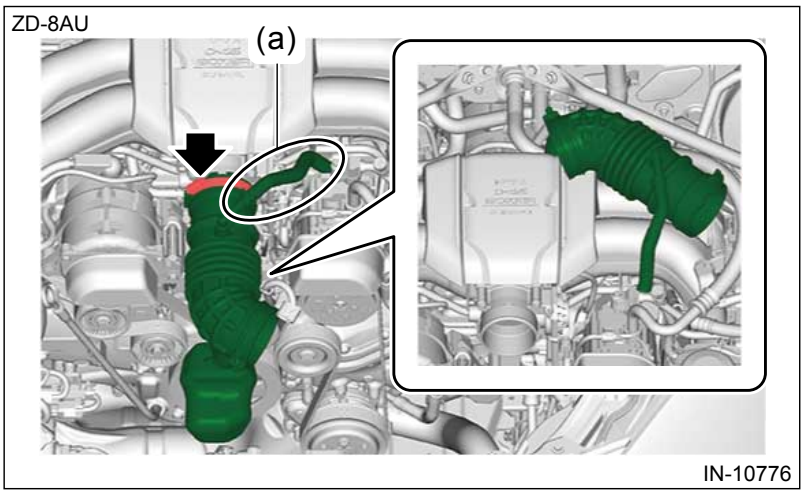
   Note:
   This operation is required only when the radiator and the condenser assembly are removed as a single unit.
3. Perform the steps below to remove the air intake boot, and place it aside so that it does not interfere with the work.

   Caution:
   Do not disconnect the PCV hose No. 2 (a).

   (1) Remove the air cleaner case. Ref. to INTAKE (INDUCTION)(H4DO)>Air Cleaner Case>REMOVAL.

   (2) Loosen the clamp, remove the air intake boot, and place it aside so that it does not interfere with the work.

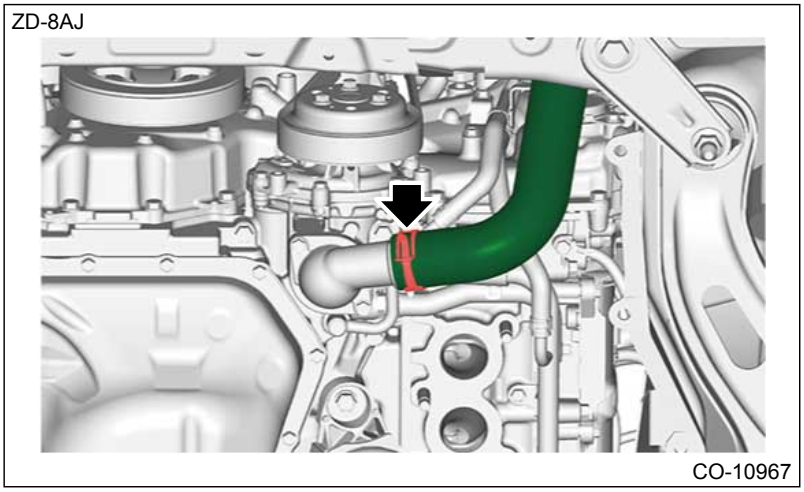
   Caution:
   Be careful not to pull out the PCV hose No. 2 (a).



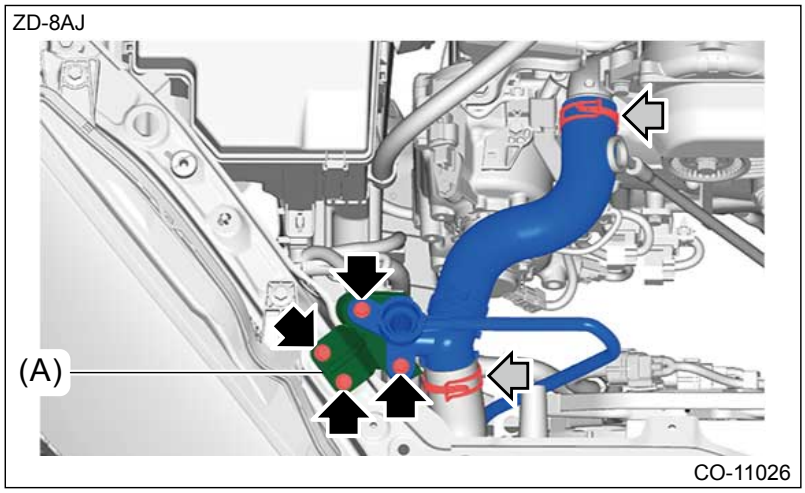
4. Remove the reservoir tank. Ref. to COOLING(H4DO)>Reservoir Tank>REMOVAL.
5. Remove the bumper face front. Ref. to EXTERIOR/INTERIOR TRIM>Front Bumper>REMOVAL > BUMPER FACE.
6. Remove the air intake duct and air intake plate. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake

Duct>REMOVAL.

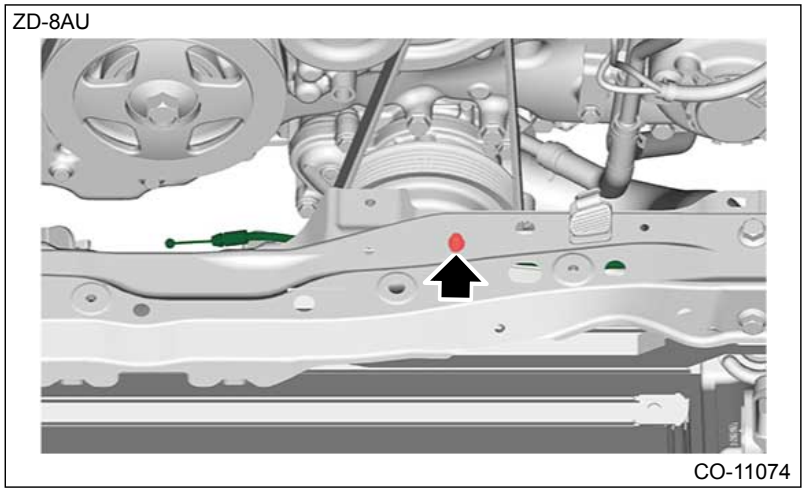
7. Drain engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT > DRAINING OF ENGINE COOLANT.
8. Remove the front exhaust pipe. Ref. to EXHAUST(H4DO)>Front Exhaust Pipe>REMOVAL > FRONT EXHAUST PIPE.
9. Disconnect radiator outlet hose.



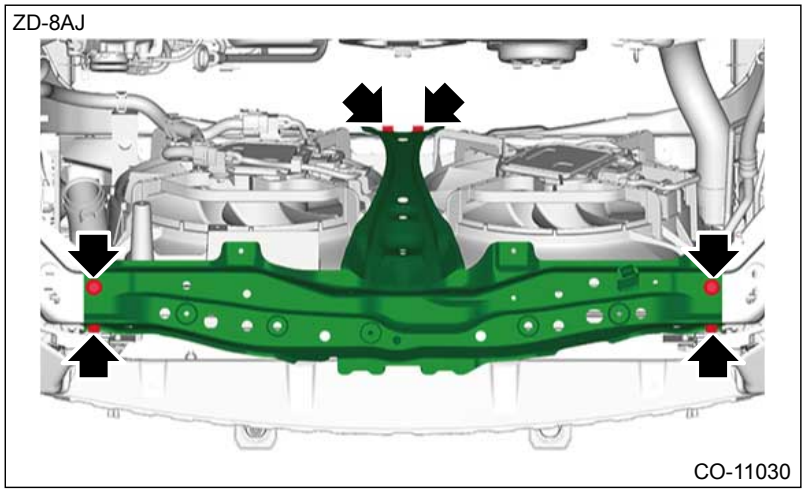
10. Remove the bracket (A).
11. Remove the radiator inlet hose No. 1, filler assembly, and over flow hose as a single unit.



12. Remove the lock assembly front hood. Ref. to SECURITY AND LOCKS>Front Hood Lock Assembly>REMOVAL > HOOD LOCK ASSEMBLY.
13. Remove the clip securing the cable assembly front hood, and place the cable assembly front hood aside so that it does not interfere with the work.



14. Remove the panel complete, radiator center.

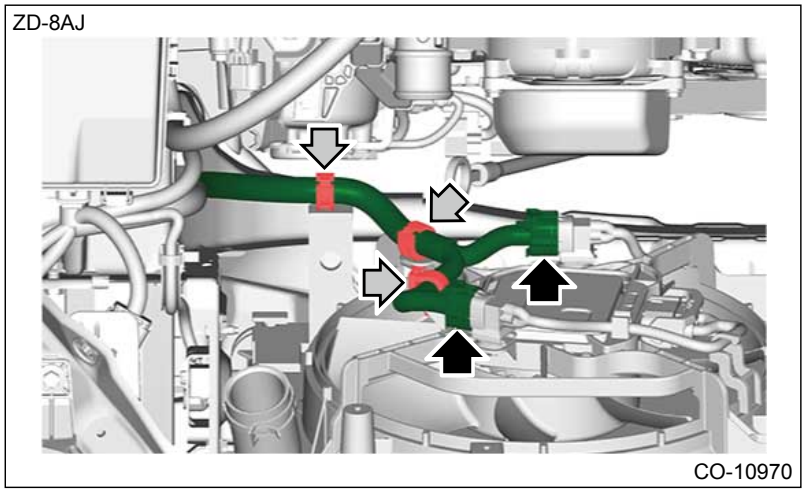


15. Disconnect the connector from the radiator main fan harness and radiator sub fan harness.

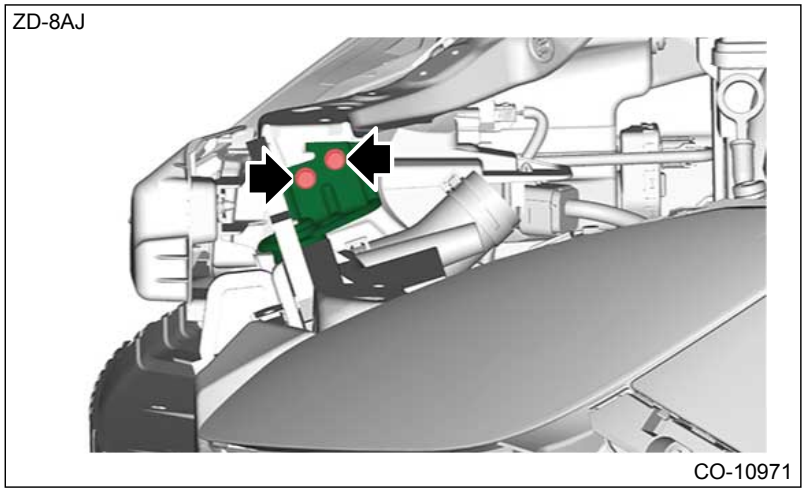
16. Open the claw on the clip and remove the bulkhead wiring harness.

Note:

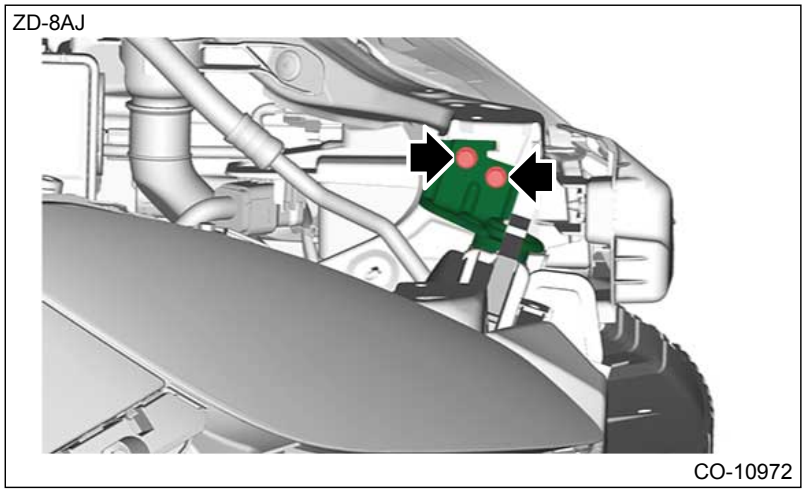
During installation, mark the installation position of the bulkhead wiring harness based on the clip.



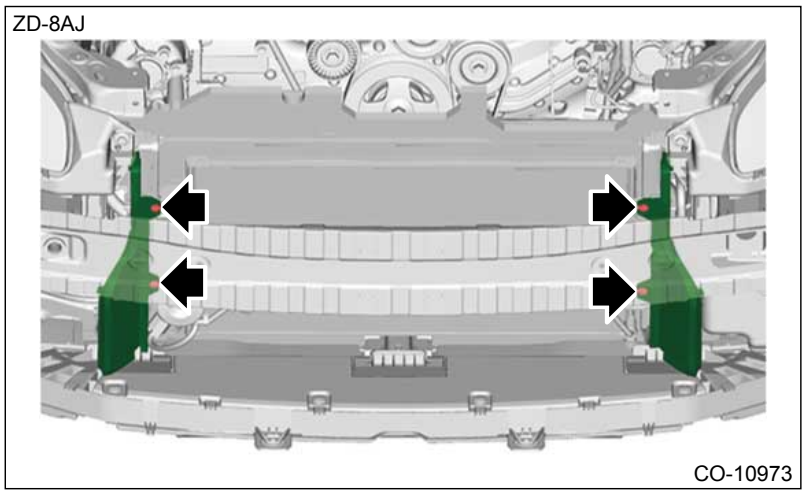
17. Remove the radiator upper bracket RH.



18. Remove the radiator upper bracket LH.



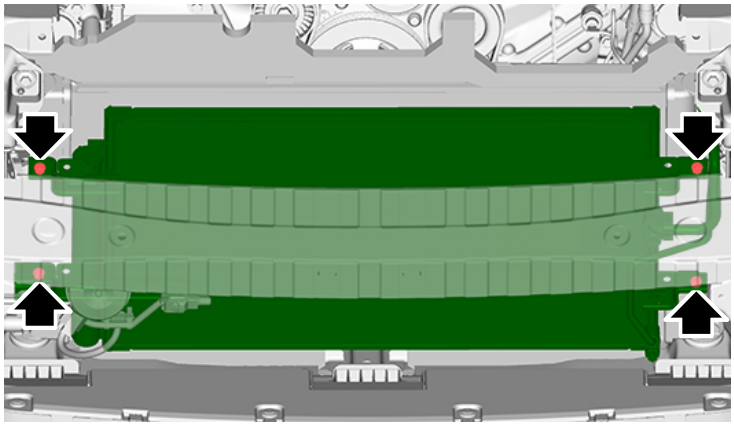
19. Remove the air guide RH and the air guide LH.



20. When the condenser assembly is not removed

(1) Remove the bolts which hold the condenser assembly to the radiator.

ZD-8AJ



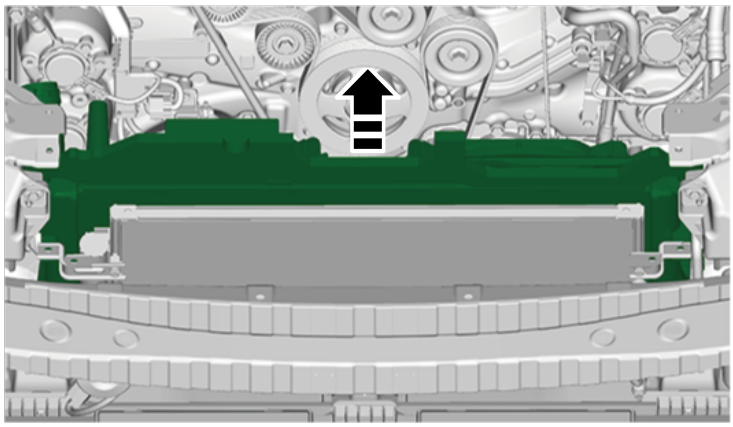
CO-10974

(2) Remove the radiator and the radiator fan & fan motor assembly as an assembly.

Caution:

- **Be careful not to damage the condenser assembly and radiator fins.**
- **If a damaged fin is found, repair it using a thin screwdriver.**

ZD-8AJ



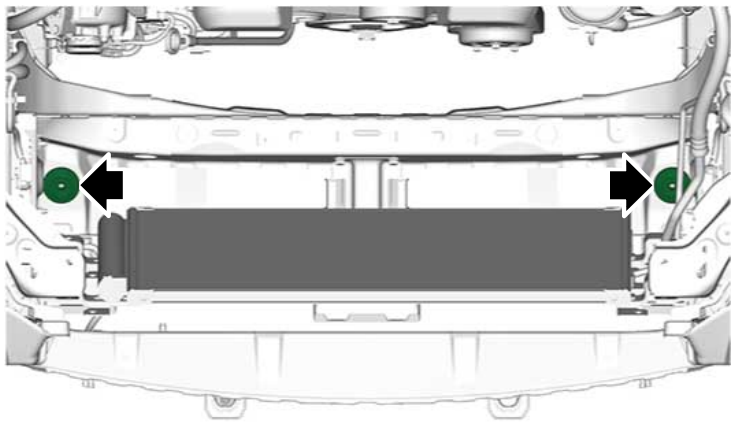
CO-10975

(3) Remove the radiator lower cushion.

Note:

Perform this procedure only when required.

ZD-8AJ

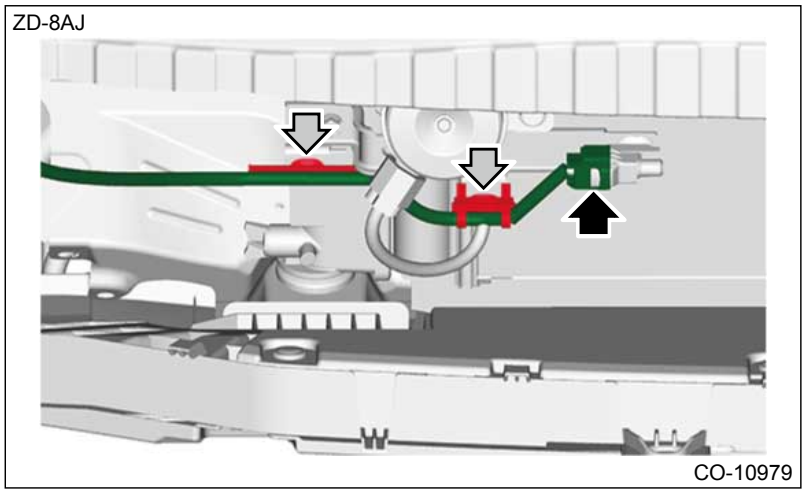


CO-10978

21. When removing the condenser assembly too

(1) Disconnect the connector from ambient sensor.

(2) Remove the clip securing the bulkhead wiring harness.

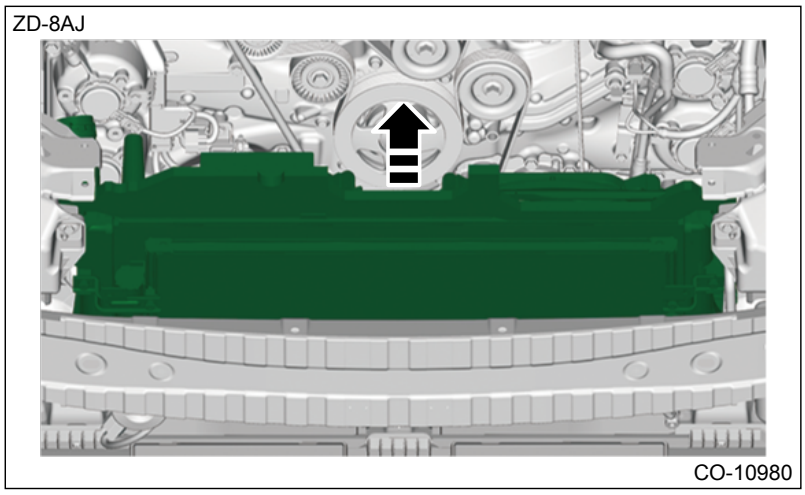


(3) Disconnect the hose pressure discharge and the pipe evaporator cooling from the condenser assembly. Ref. to AIR CONDITIONER>Condenser>REMOVAL.

(4) Remove the radiator, radiator fan & fan motor assembly and condenser assembly as a single unit.

Caution:

- **Be careful not to damage the condenser assembly and radiator fins.**
- **If a damaged fin is found, repair it using a thin screwdriver.**

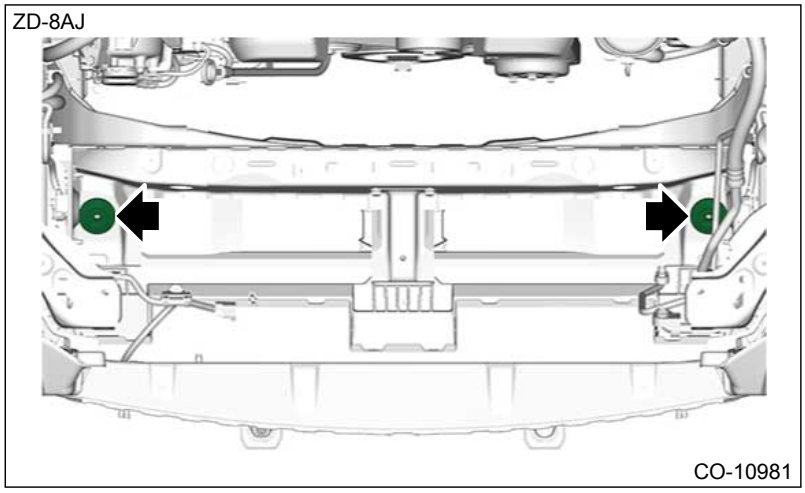


(5) Remove the condenser assembly from the radiator. Ref. to AIR CONDITIONER>Condenser>REMOVAL.

(6) Remove the radiator lower cushion.

Note:

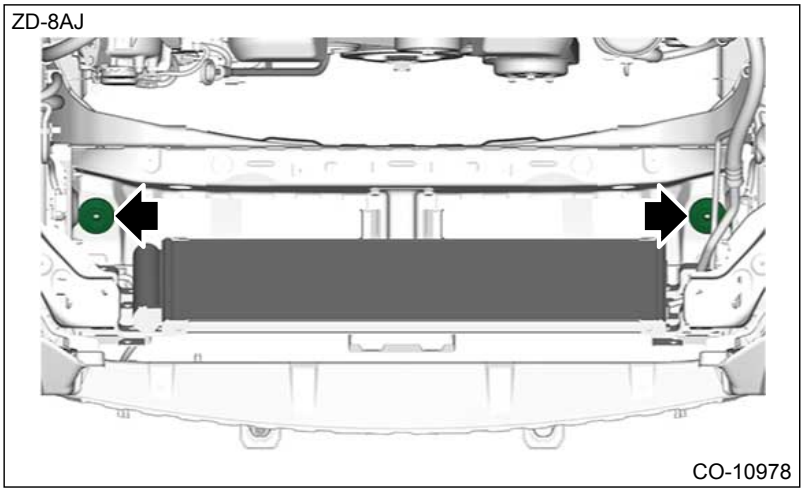
Perform this procedure only when required.



COOLING(H4DO) > Radiator

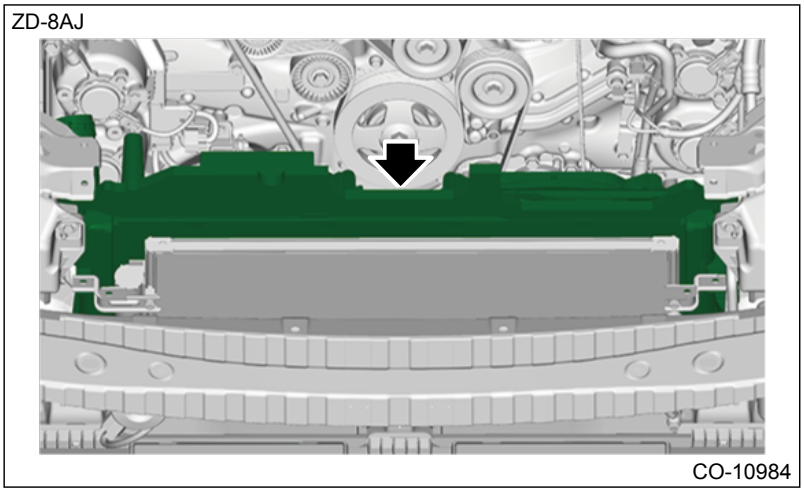
INSTALLATION

1. When the condenser assembly is not removed
(1) Install the radiator lower cushion.



(2) Install the radiator and the radiator fan & fan motor assembly as an assembly.

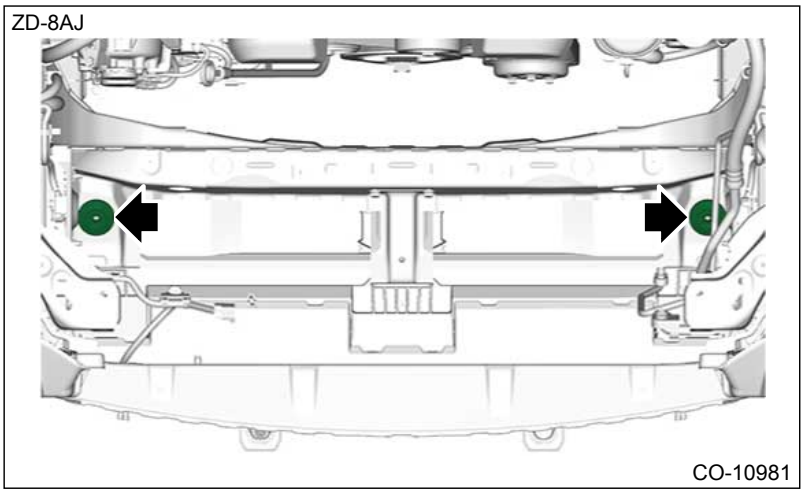
Note:
Insert the pin on the lower side of the radiator into the radiator lower cushions.



(3) Install the condenser assembly to the radiator. Ref. to AIR CONDITIONER>Condenser>INSTALLATION.

2. When assembled together with the condenser assembly

(1) Install the radiator lower cushion.

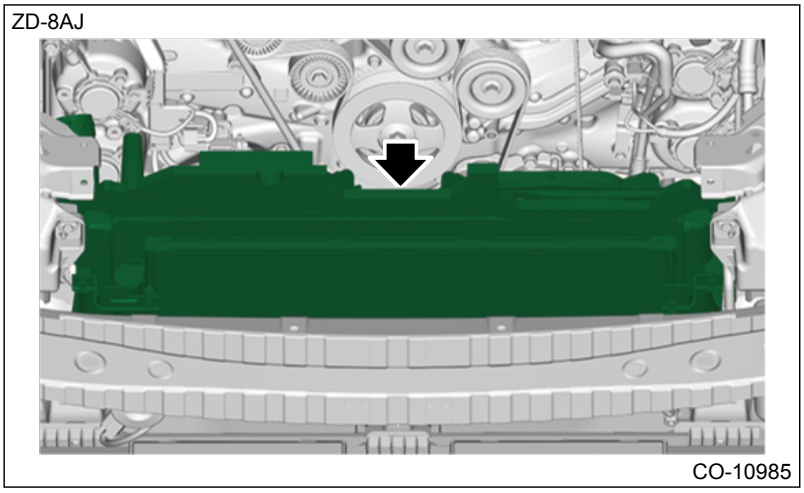


(2) Install the condenser assembly to the radiator. Ref. to AIR CONDITIONER>Condenser>INSTALLATION.

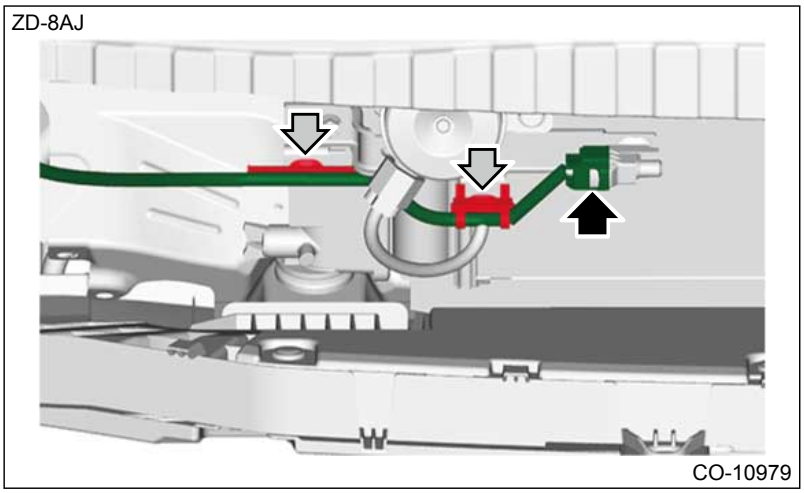
(3) Install the radiator, radiator fan & fan motor assembly, and the condenser assembly as an assembly.

Note:

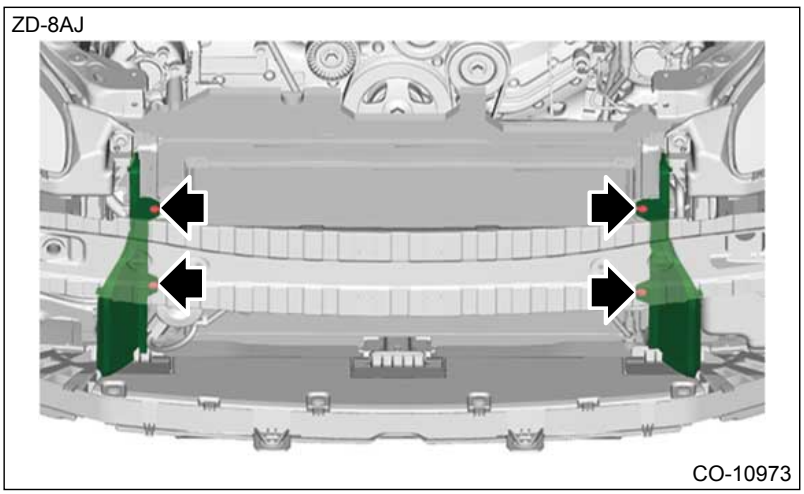
Insert the pin on the lower side of the radiator into the radiator lower cushions.



(4) Connect the hose pressure discharge and the pipe evaporator cooling to the condenser assembly.
Ref. to AIR CONDITIONER>Condenser>INSTALLATION.
(5) Secure the bulkhead wiring harness with the clip.
(6) Connect the connector to the ambient sensor.



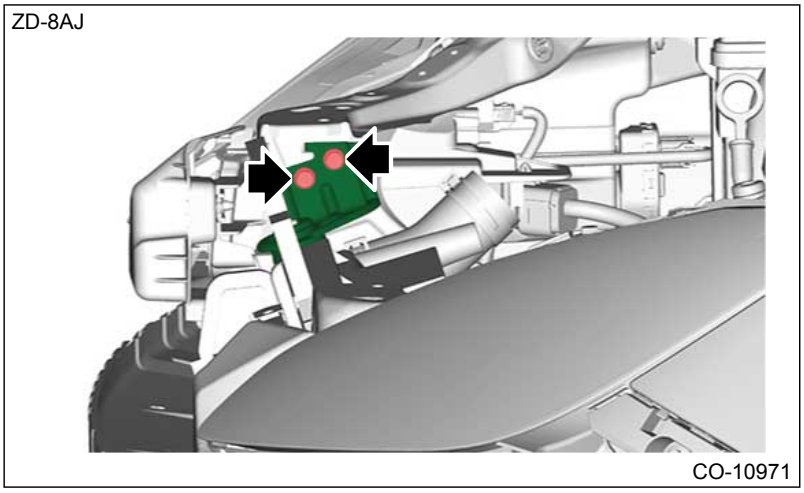
3. Install the air guide RH and the air guide LH.



4. Install the radiator upper bracket RH.

Tightening torque:

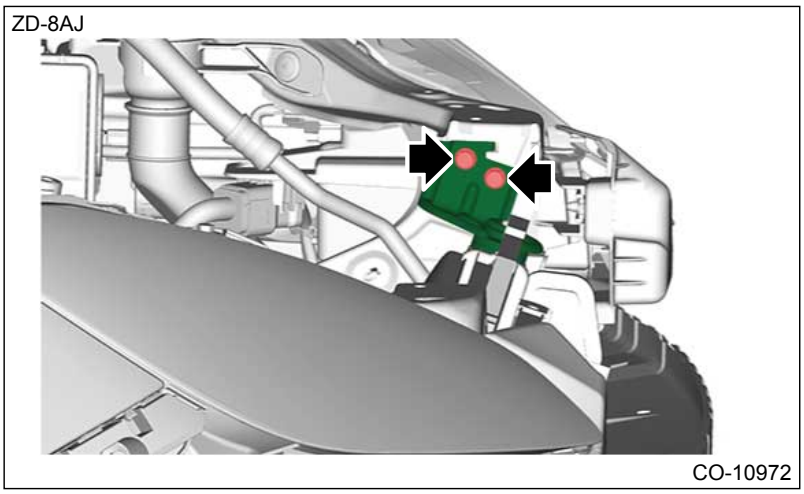
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



5. Install the radiator upper bracket LH.

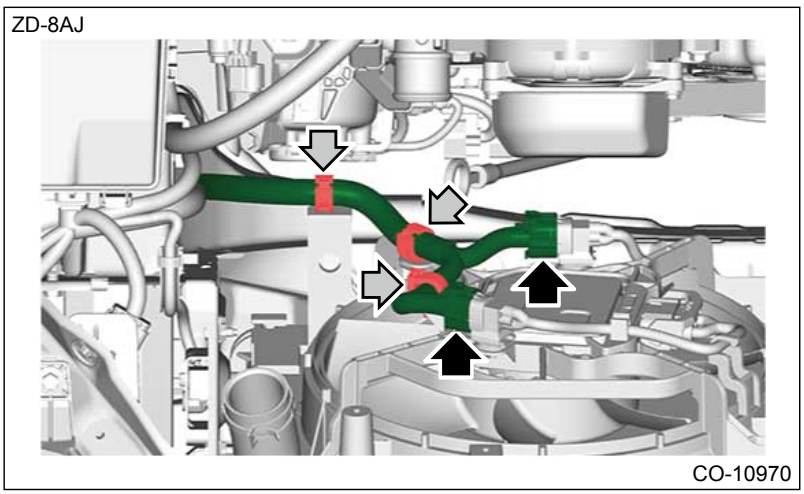
Tightening torque:

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



6. Connect the connector to the radiator main fan harness and radiator sub fan harness.

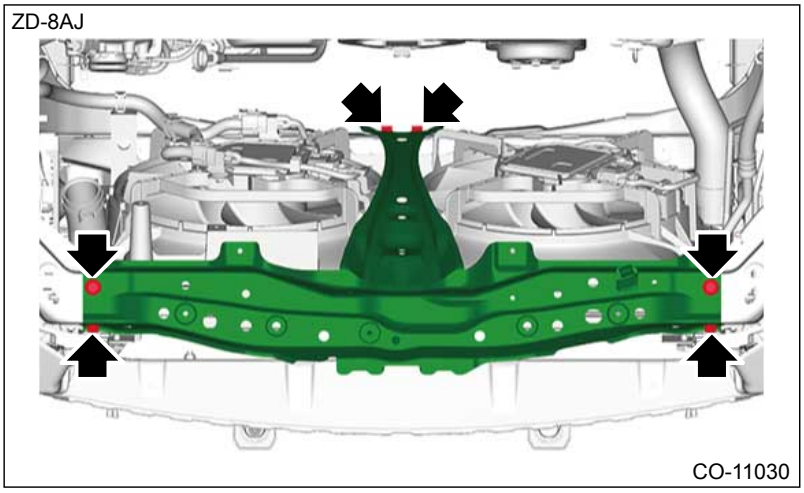
7. Secure the bulkhead wiring harness with the clip.



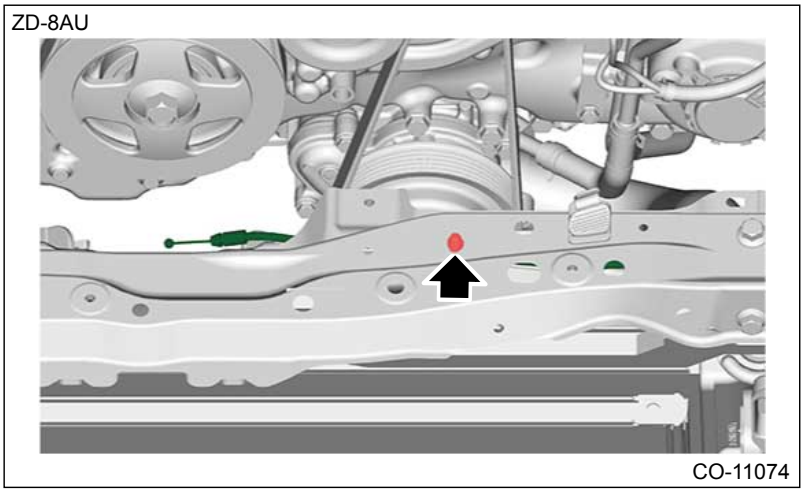
8. Install the panel complete, radiator center.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)



9. Secure the cable assembly front hood with the clip.



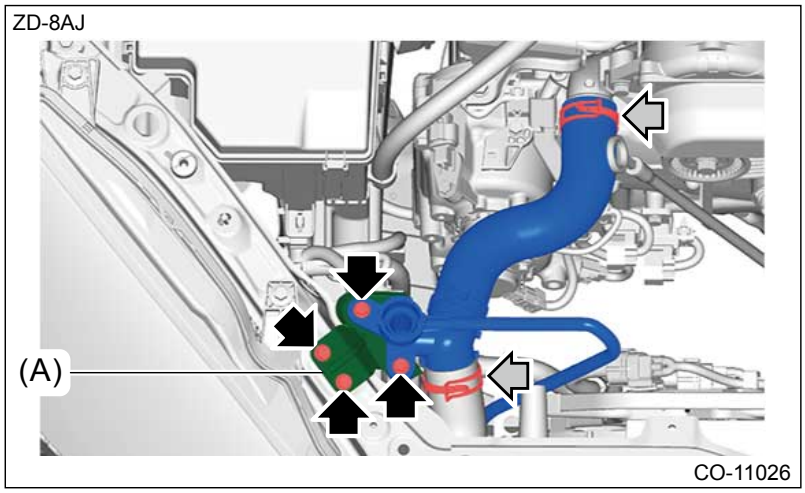
10. Install the lock assembly front hood. Ref. to SECURITY AND LOCKS>Front Hood Lock Assembly>INSTALLATION > HOOD LOCK ASSEMBLY.

11. Install the radiator inlet hose No. 1, filler assembly, and over flow hose as a single unit.

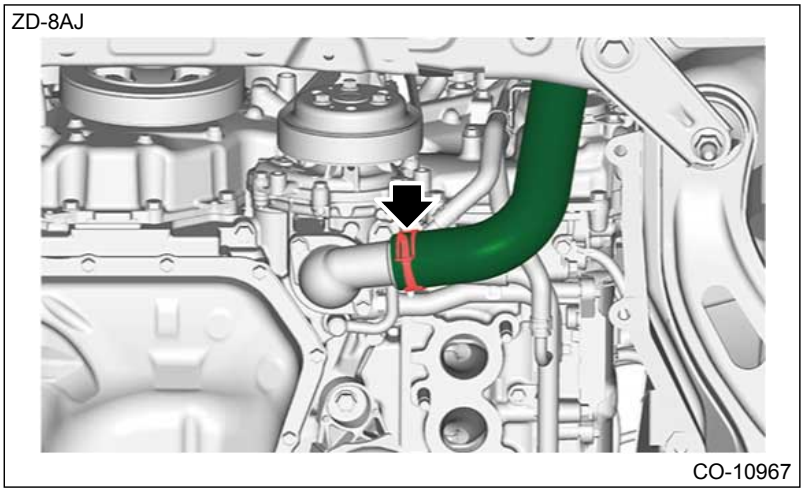
12. Install the bracket (A).

Tightening torque:

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



13. Connect the radiator outlet hose.

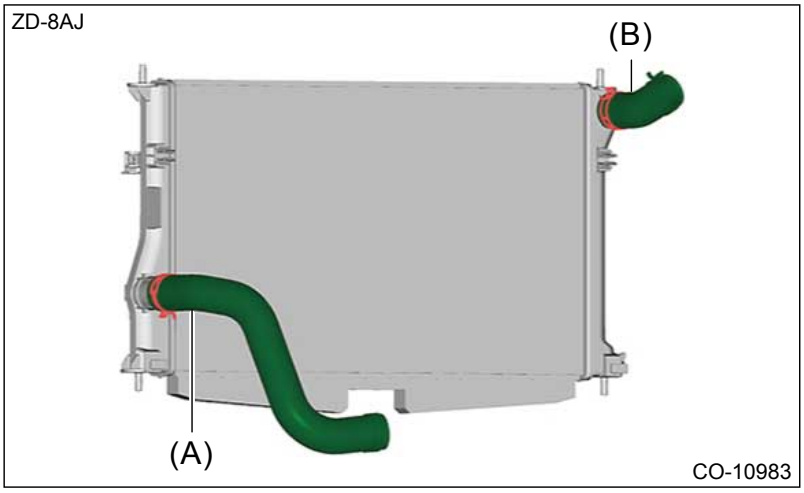


14. Install the front exhaust pipe. Ref. to EXHAUST(H4DO)>Front Exhaust Pipe>INSTALLATION > FRONT EXHAUST PIPE.
15. Install the air intake plate and air intake duct. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Duct>INSTALLATION.
16. Install the bumper face front. Ref. to EXTERIOR/INTERIOR TRIM>Front Bumper>INSTALLATION > BUMPER FACE.
17. Install the reservoir tank. Ref. to COOLING(H4DO)>Reservoir Tank>INSTALLATION.
18. Install the air intake boot. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>INSTALLATION.
19. Connect the ground terminal to battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.
20. Fill engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT > FILLING OF ENGINE COOLANT.

COOLING(H4DO) > Radiator

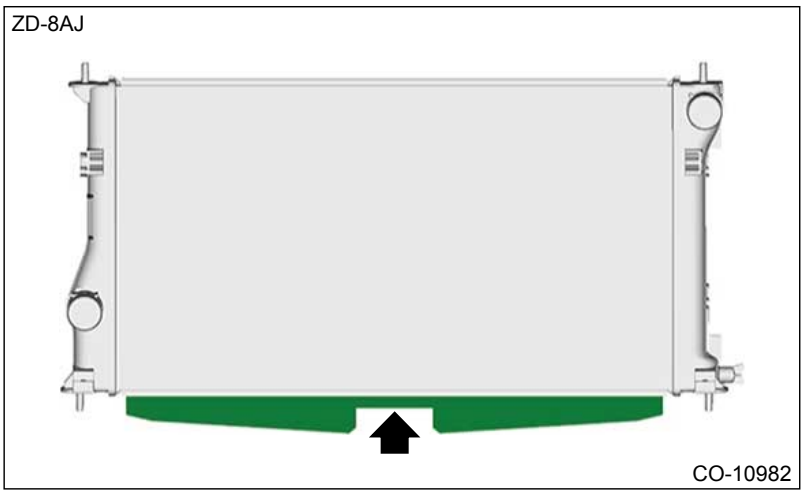
DISASSEMBLY

1. Remove the radiator fan and fan motor assembly. Ref. to COOLING(H4DO)>Radiator Fan and Fan Motor Assembly>REMOVAL.
2. Remove the radiator outlet hose (A) and radiator inlet hose No. 2 (B).



3. Remove the radiator lower gasket.

Note:
This operation is required only when replacing the radiator lower gasket.



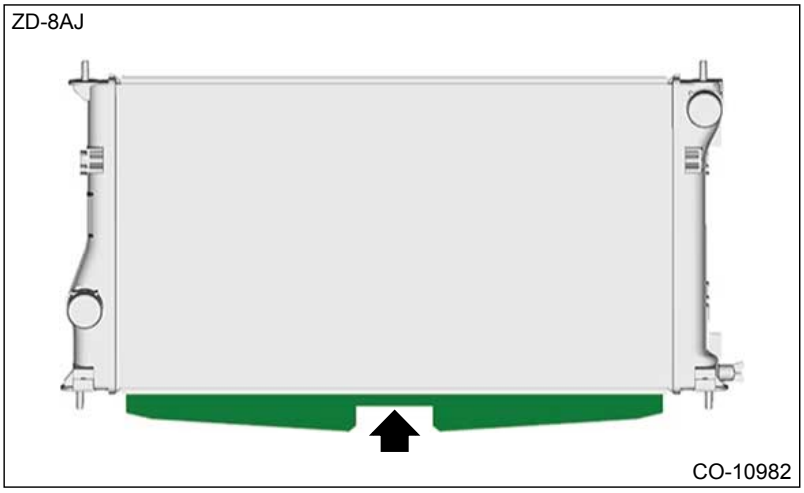
COOLING(H4DO) > Radiator

ASSEMBLY

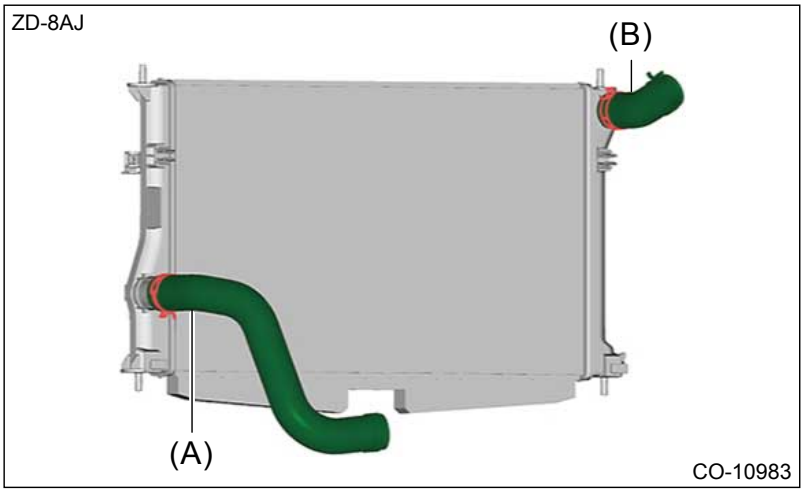
1. Attach the radiator lower gasket.

Caution:
Always use a new radiator lower gasket.

Note:
As the width is the same as with the radiator, attach it along the groove.



2. Install the radiator outlet hose (A) and radiator inlet hose No. 2 (B).



3. Install the radiator fan and fan motor assembly. Ref. to COOLING(H4DO)>Radiator Fan and Fan Motor Assembly>INSTALLATION.

COOLING(H4DO) > Radiator

INSPECTION

1. ENGINE COOLANT LEAKAGE CHECK

Refer to "Engine coolant leakage check" for the inspection procedure. Ref. to COOLING(H4DO)>Engine Coolant>INSPECTION > ENGINE COOLANT LEAKAGE CHECK.

2. OTHER INSPECTIONS

1. Check that there is no deformation, cracks or other damages.
2. Check that the hose has no cracks, damage or loose part.
3. Check the radiator fins for clogging.

INSPECTION

Caution:
- **Stop the engine.**
- **The engine coolant is pressurized when it is hot. Wait until engine coolant cools down before proceeding the work.**
- **If the engine coolant is spilt over the engine, exhaust pipe or the under cover, completely wipe it off to avoid emission of smoke or causing a fire.**

1. Remove the radiator cap.
2. Check that there is no deformation, cracks or other damages.
3. Check the opening pressure of the radiator cap.
   (1) Attach radiator cap tester.
   (2) Check the maximum pressure while pumping the radiator cap tester several times. Replace the radiator cap if its valve opens at less than the service limit.

Caution:
- **Be sure to remove foreign matter and rust from the cap in advance. Otherwise, results of pressure test will be incorrect.**
- **For this inspection, tilt the radiator cap tester by at least 30°.**

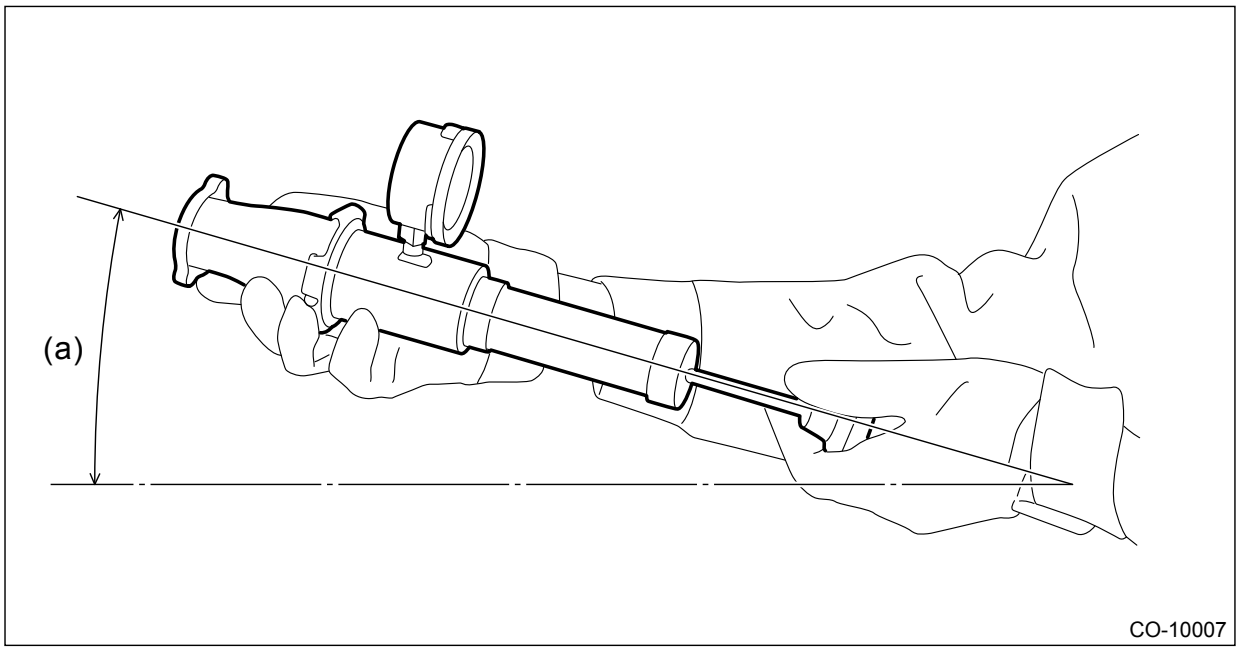
Note:
- **Pumping interval is one second at a time.**
- **If the radiator cap cannot retain the maximum pressure at times, this is not malfunction.**

Specification:

93 — 123 kPa (0.95 — 1.25 kg/cm^2, 14 — 18 psi)

Service limit:

83 kPa (0.85 kg/cm^2, 12 psi)



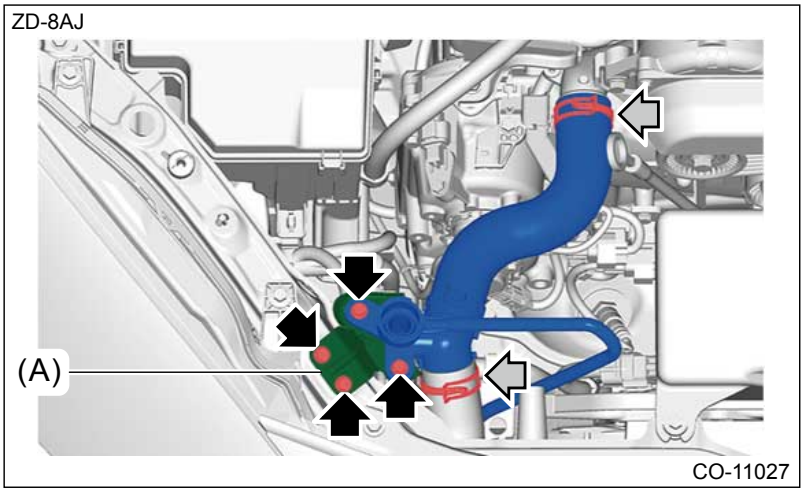
(a) 30° or more

REMOVAL

1. RADIATOR INLET HOSE

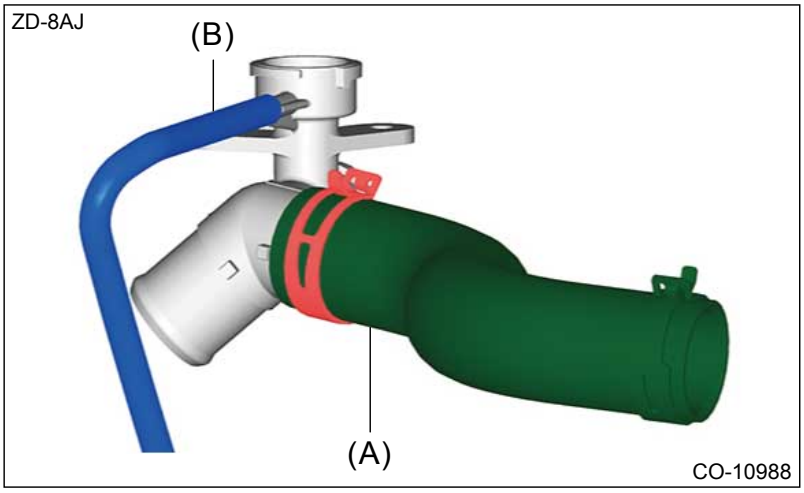
Caution:
- **The engine coolant is pressurized when it is hot. Wait until engine coolant cools down before proceeding the work.**
- **If the engine coolant is spilt over the engine, exhaust pipe or the under cover, completely wipe it off to avoid emission of smoke or causing a fire.**

1. Drain engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT > DRAINING OF ENGINE COOLANT.
2. Remove the reservoir tank. Ref. to COOLING(H4DO)>Reservoir Tank>REMOVAL.
3. Remove the bracket (A).
4. Remove the radiator inlet hose No. 1, filler assembly, and over flow hose as a single unit.

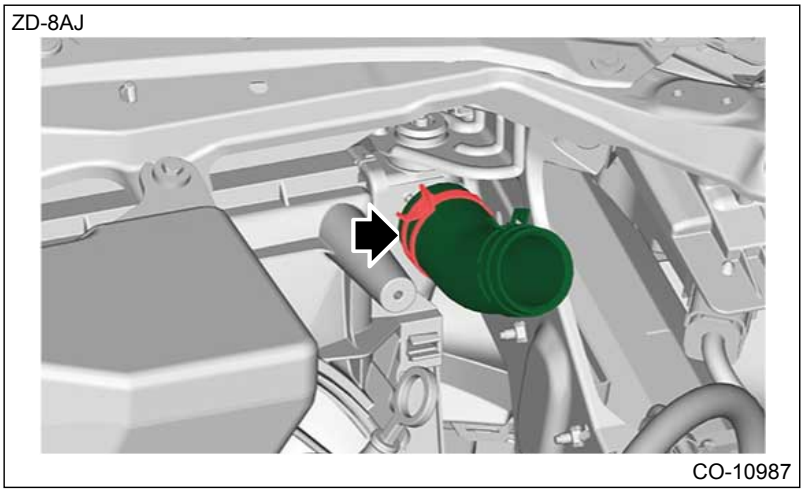


5. Remove the radiator inlet hose No. 1 (A) from the filler assembly.
6. Remove the over flow hose (B) from the filler assembly.

Note:
Perform this procedure only when required.



7. Remove the radiator inlet hose No. 2.



2. RADIATOR OUTLET HOSE

Caution:

- **The engine coolant is pressurized when it is hot. Wait until engine coolant cools down before proceeding the work.**
- **If the engine coolant is spilt over the engine, exhaust pipe or the under cover, completely wipe it off to avoid emission of smoke or causing a fire.**

1. Disconnect the ground terminal from battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.

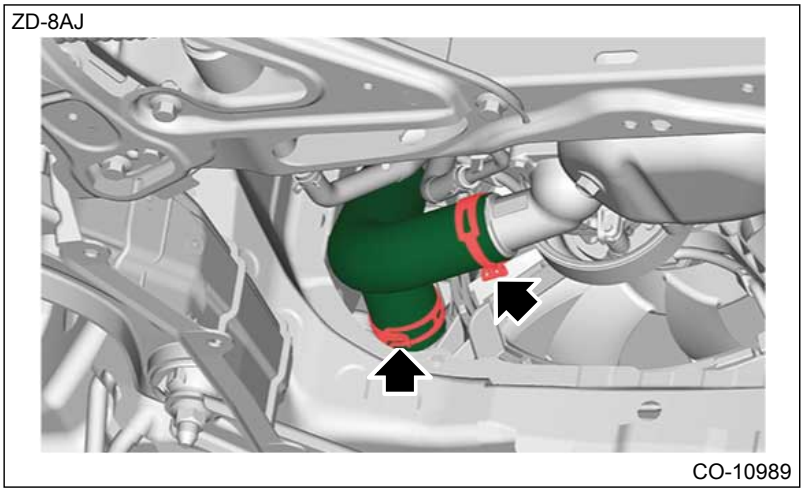
2. Drain engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT > DRAINING OF ENGINE COOLANT.

3. Remove the front exhaust pipe. Ref. to EXHAUST(H4DO)>Front Exhaust Pipe>REMOVAL > FRONT EXHAUST PIPE.

4. Remove the radiator outlet hose.

Note:

To prevent engine coolant from splashing, disconnect the thermostat cover side first, and drain the engine coolant remaining inside the radiator outlet hose before removing the hose.

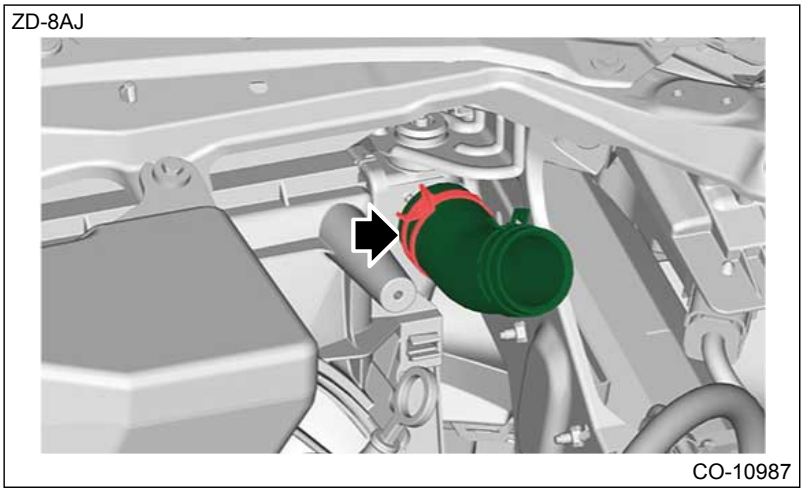


COOLING(H4DO) > Radiator Hose

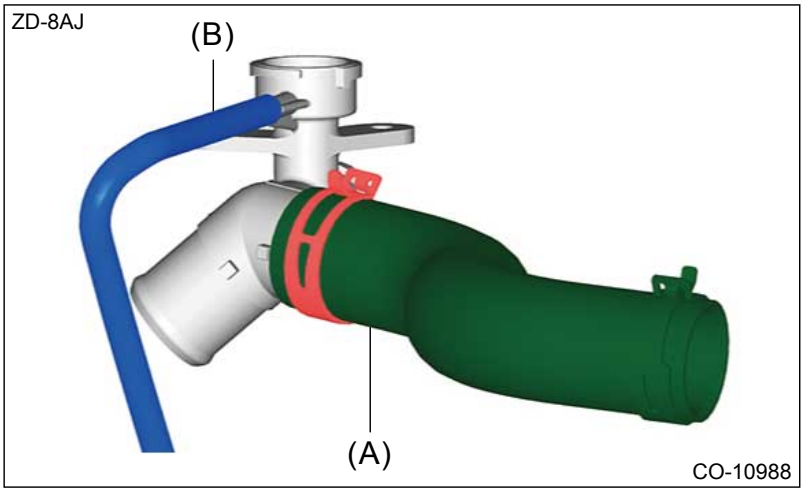
INSTALLATION

1. RADIATOR INLET HOSE

1. Install the radiator inlet hose No. 2.



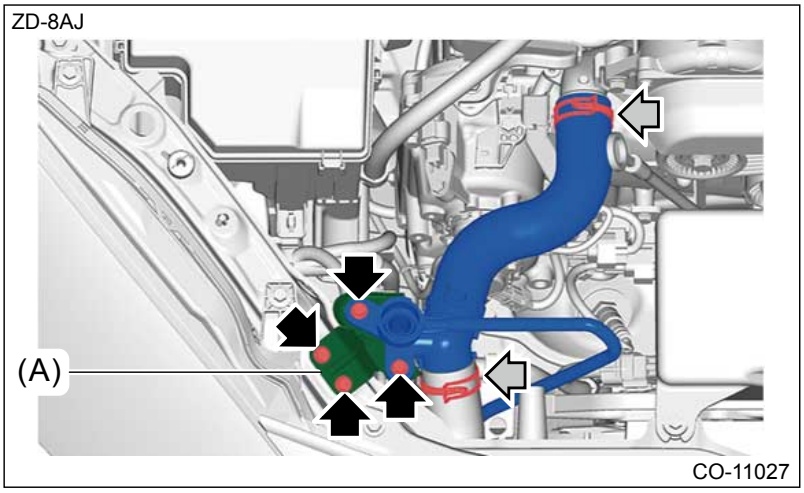
2. Install the over flow hose (B) to the filler assembly.
3. Install the radiator inlet hose No. 1 (A) to the filler assembly.



4. Install the radiator inlet hose No. 1, filler assembly, and over flow hose as a single unit.
5. Install the bracket (A).

Tightening torque:

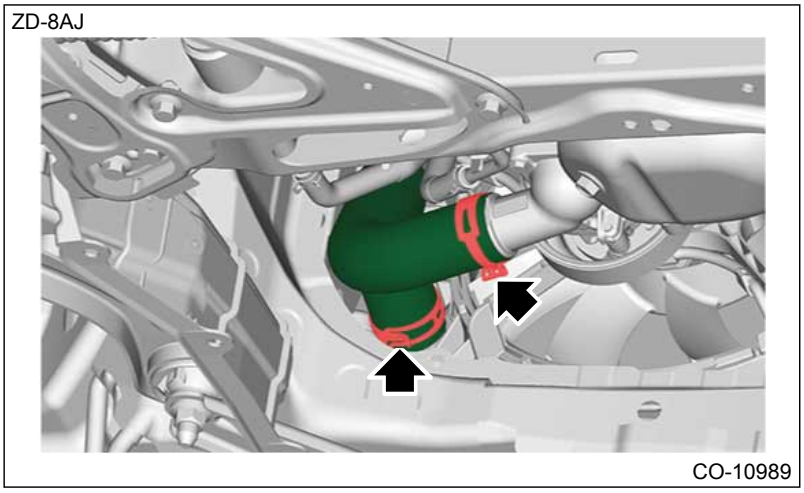
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



6. Install the reservoir tank. Ref. to COOLING(H4DO)>Reservoir Tank>INSTALLATION.
7. Fill engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT > FILLING OF ENGINE COOLANT.

2. RADIATOR OUTLET HOSE

1. Install the radiator outlet hose.



2. Install the front exhaust pipe. Ref. to EXHAUST(H4DO)>Front Exhaust Pipe>INSTALLATION > FRONT EXHAUST PIPE.
3. Connect the ground terminal to battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.
4. Fill engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT > FILLING OF ENGINE COOLANT.

COOLING(H4DO) > Radiator Hose

INSPECTION

1. ENGINE COOLANT LEAKAGE CHECK

Refer to "Engine coolant leakage check" for the inspection procedure. Ref. to COOLING(H4DO)>Engine Coolant>INSPECTION > ENGINE COOLANT LEAKAGE CHECK.

2. OTHER INSPECTIONS

1. Check that there is no deformation, cracks or other damages.
2. Check that the hose has no cracks, damage or loose part.

REMOVAL

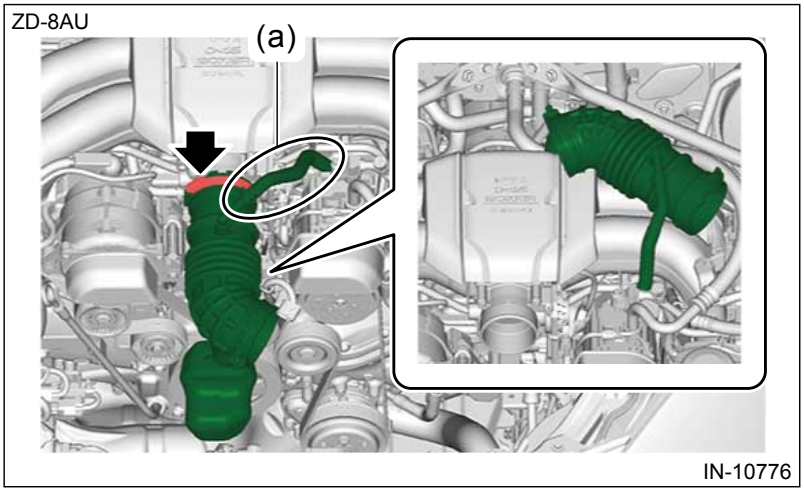
1. Disconnect the ground terminal from battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.
2. Perform the steps below to remove the air intake boot, and place it aside so that it does not interfere with the work.

Caution:
Do not disconnect the PCV hose No. 2 (a).

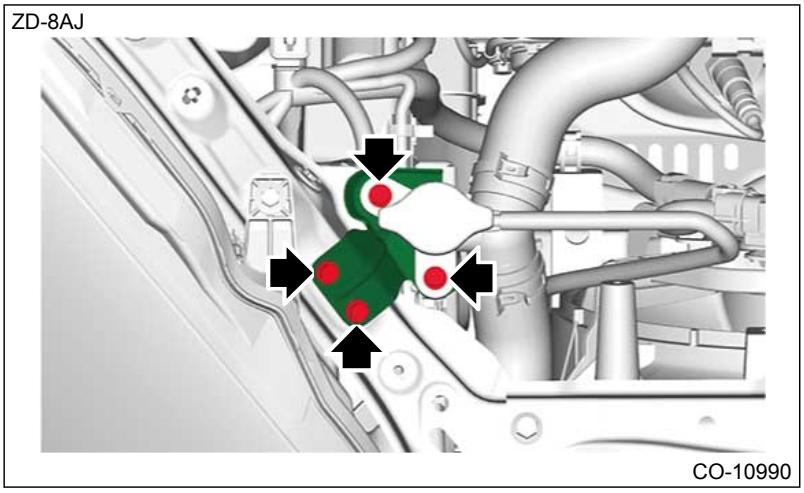
(1) Remove the air cleaner case. Ref. to INTAKE (INDUCTION)(H4DO)>Air Cleaner Case>REMOVAL.

(2) Loosen the clamp, remove the air intake boot, and place it aside so that it does not interfere with the work.

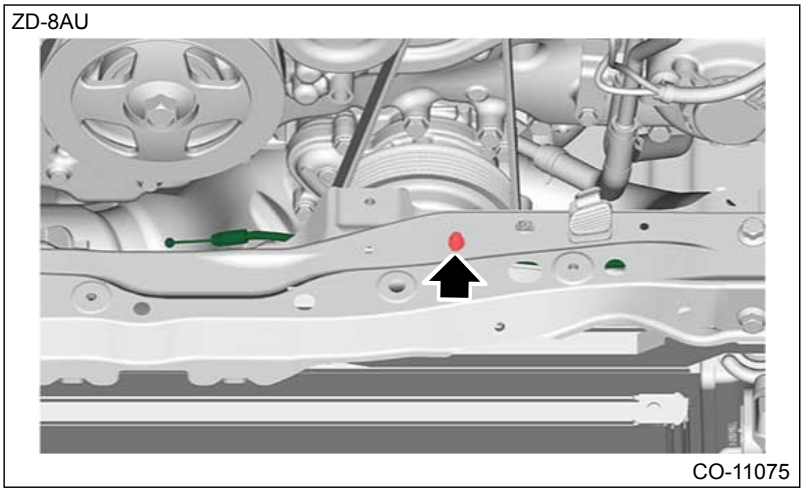
Caution:
Be careful not to pull out the PCV hose No. 2 (a).



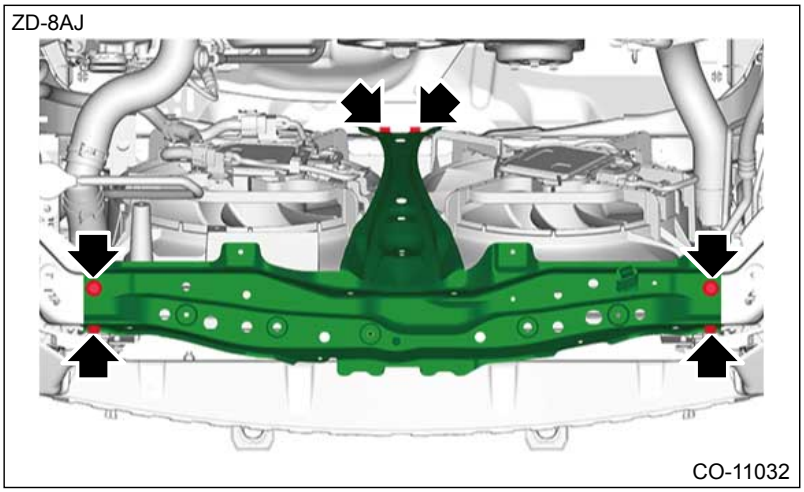
3. Remove the reservoir tank. Ref. to COOLING(H4DO)>Reservoir Tank>REMOVAL.
4. Remove the bumper face front. Ref. to EXTERIOR/INTERIOR TRIM>Front Bumper>REMOVAL > BUMPER FACE.
5. Remove the air intake duct and air intake plate. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Duct>REMOVAL.
6. Remove the bracket.



7. Remove the lock assembly front hood. Ref. to SECURITY AND LOCKS>Front Hood Lock Assembly>REMOVAL > HOOD LOCK ASSEMBLY.
8. Remove the clip securing the cable assembly front hood, and place the cable assembly front hood aside so that it does not interfere with the work.



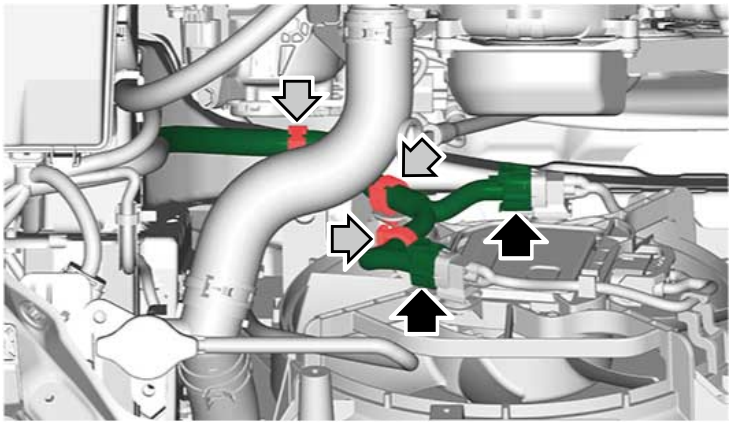
9. Remove the panel complete, radiator center.



10. Disconnect the connector from the radiator main fan harness and radiator sub fan harness.
11. Open the claw on the clip and remove the bulkhead wiring harness.

Note:
During installation, mark the installation position of the bulkhead wiring harness based on the clip.

ZD-8AJ



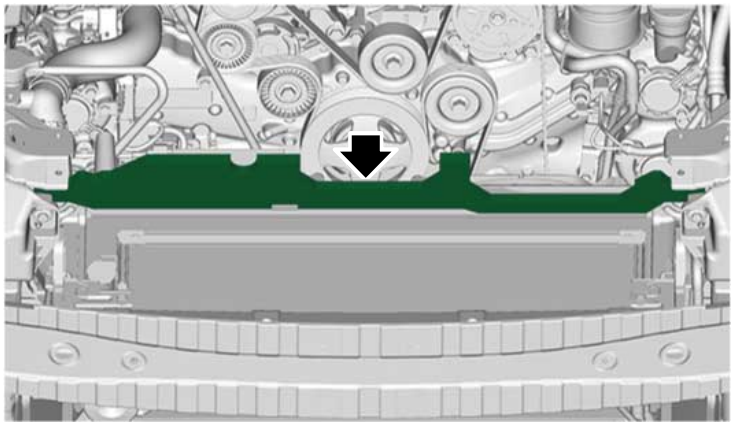
CO-10992

12. Remove the radiator fan and fan motor assembly.

(1) When replacing the radiator upper gasket

1) Remove the radiator upper gasket.

ZD-8AJ

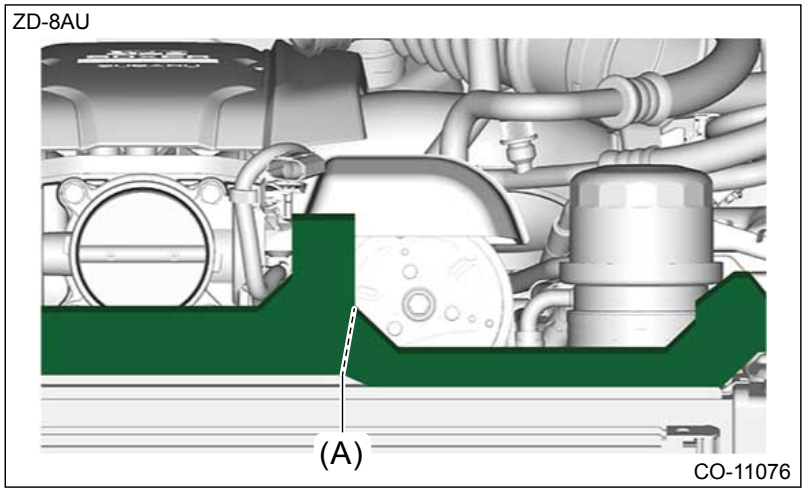


CO-11081

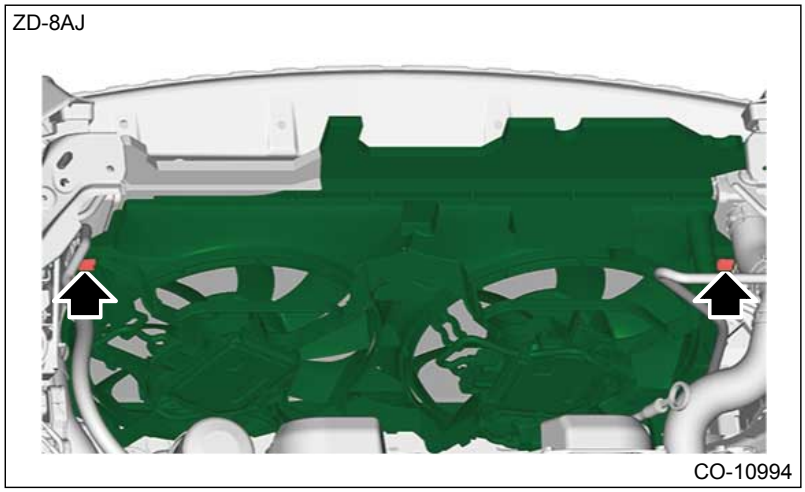
(2) When not replacing the radiator upper gasket

1) Cut the radiator upper gasket at the dotted line (A) using scissors, etc.

Note:
The cutting position is on the line from the corner of the radiator upper gasket to the edge of the radiator fan shroud.



(3) Disengage the claws and remove the radiator fan and fan motor assembly.



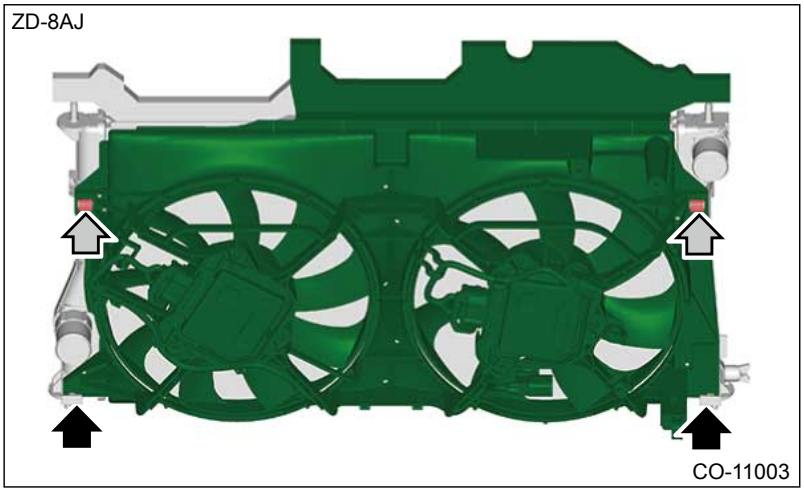
COOLING(H4DO) > Radiator Fan and Fan Motor Assembly

INSTALLATION

1. Install the radiator fan and fan motor assembly.

(1) Engage the lower side of the radiator fan & fan motor assembly to the radiator lower side.

(2) Secure the radiator fan & fan motor assembly with the claws.



(3) When replacing the radiator upper gasket

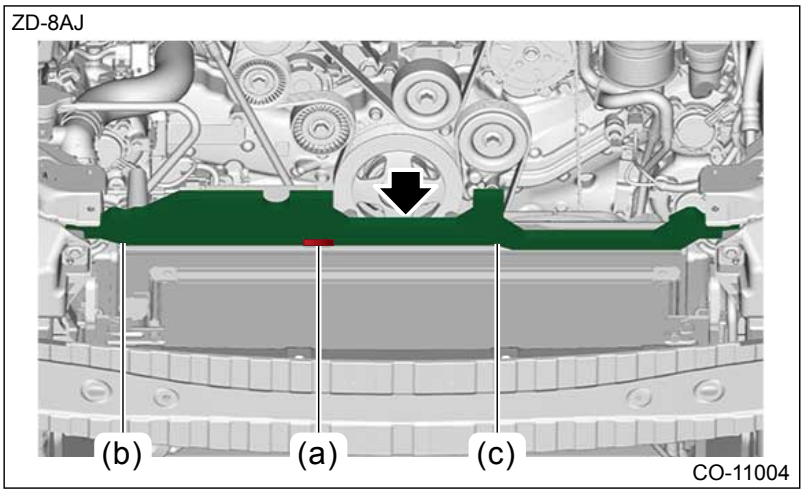
1) Attach the radiator upper gasket to the radiator fan shroud and radiator.

Caution:

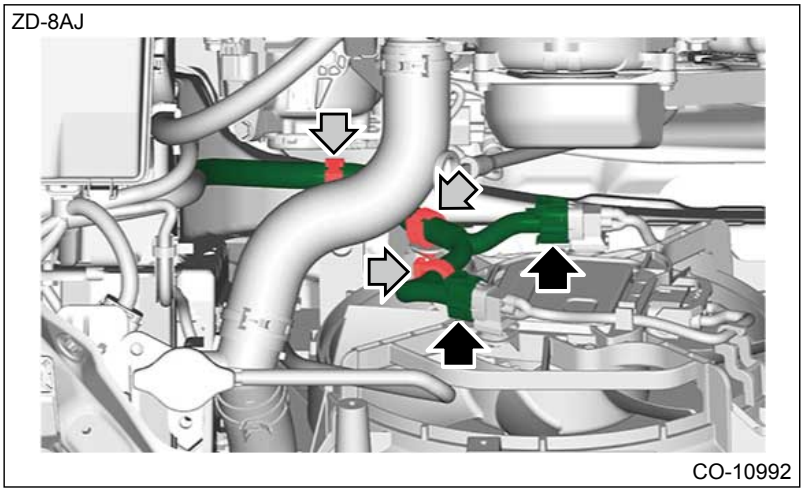
Always use a new radiator upper gasket.

Note:

- **Allow the part to touch the positioning rib (a) and attach it by aligning it with the radiator fan shroud end (b).**
- **Attach the part starting at the radiator fan shroud end (b) and align the radiator fan shroud end (c) with the corner of the radiator upper gasket.**



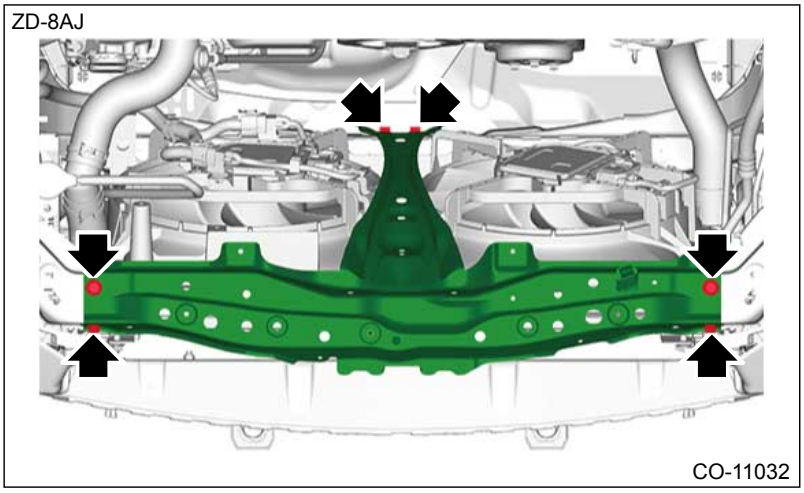
2. Connect the connector to the radiator main fan harness and radiator sub fan harness.
3. Secure the bulkhead wiring harness with the clip.



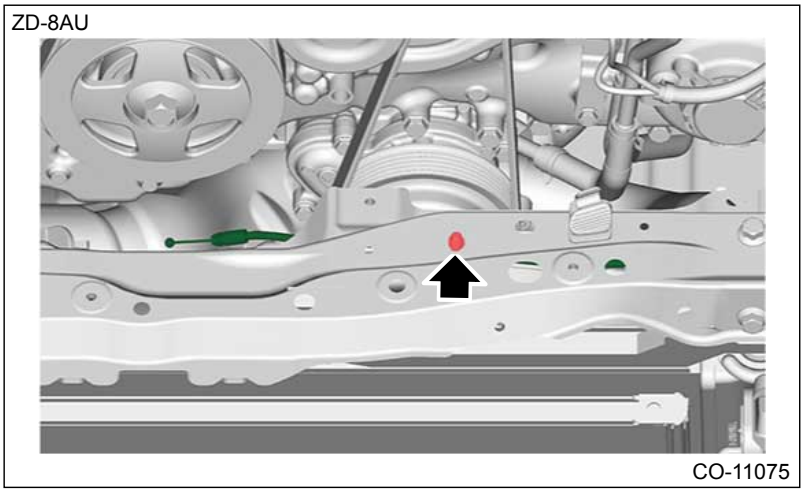
4. Install the panel complete, radiator center.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)



5. Secure the cable assembly front hood with the clip.

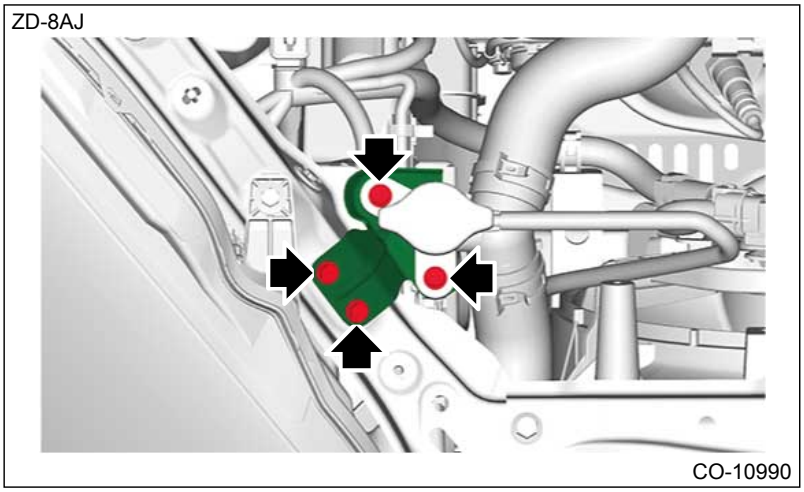


6. Install the lock assembly front hood. Ref. to SECURITY AND LOCKS>Front Hood Lock Assembly>INSTALLATION > HOOD LOCK ASSEMBLY.

7. Attach the bracket.

Tightening torque:

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



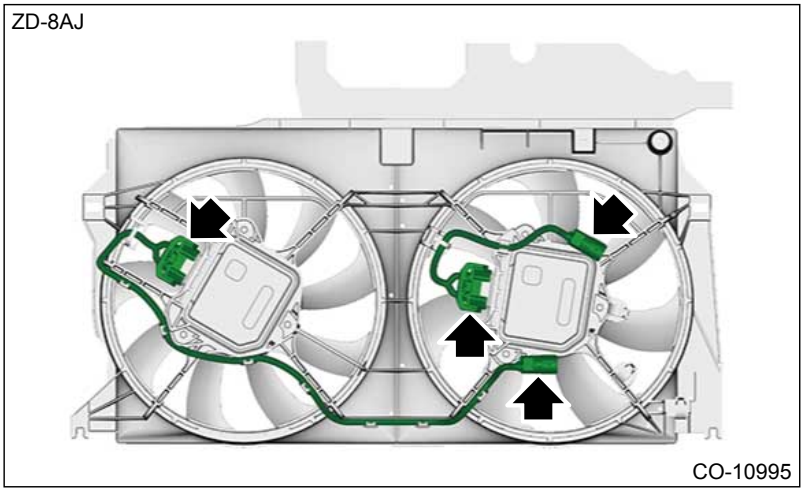
8. Install the air intake plate and air intake duct. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Duct>INSTALLATION.

9. Install the bumper face front. Ref. to EXTERIOR/INTERIOR TRIM>Front Bumper>INSTALLATION > BUMPER FACE.
10. Install the reservoir tank. Ref. to COOLING(H4DO)>Reservoir Tank>INSTALLATION.
11. Install the air intake boot. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>INSTALLATION.
12. Connect the ground terminal to battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.

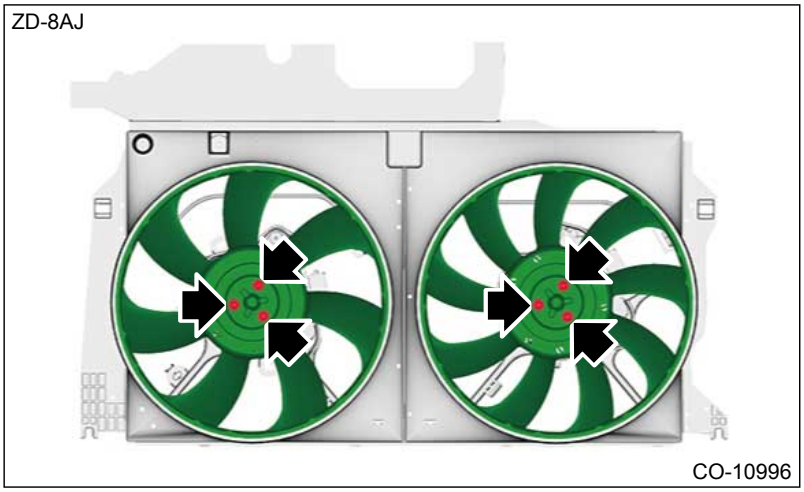
COOLING(H4DO) > Radiator Fan and Fan Motor Assembly

DISASSEMBLY

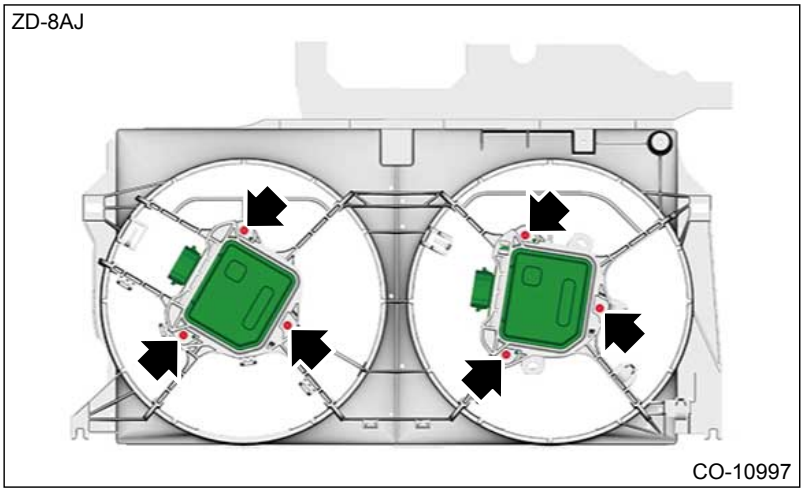
1. Remove the radiator main fan harness and the radiator sub fan harness.



2. Remove the radiator main fan and radiator sub fan.

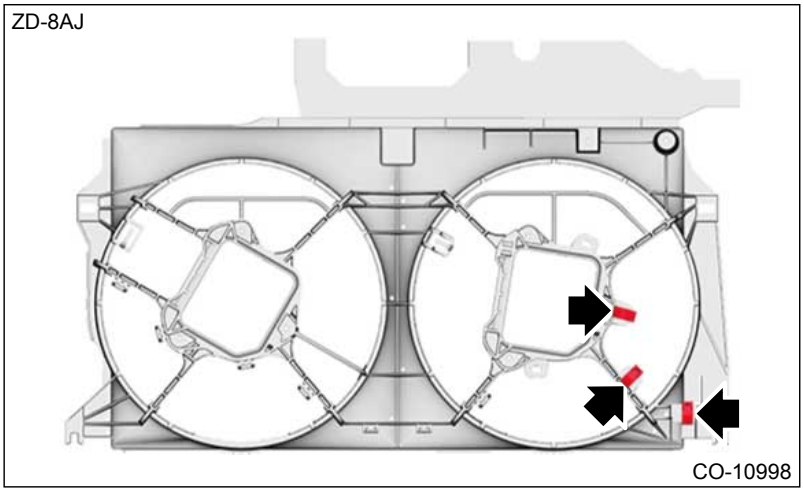


3. Remove each fan motor assembly.



4. Remove the clip.

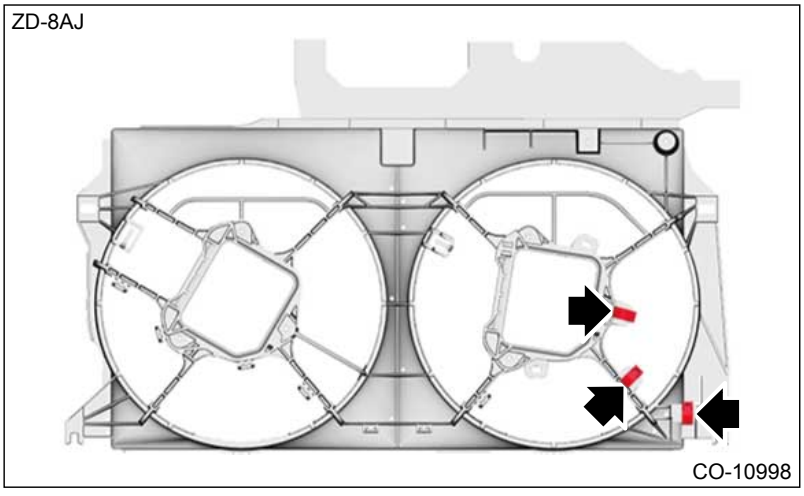
Note:
Perform this procedure only when required.



COOLING(H4DO) > Radiator Fan and Fan Motor Assembly

ASSEMBLY

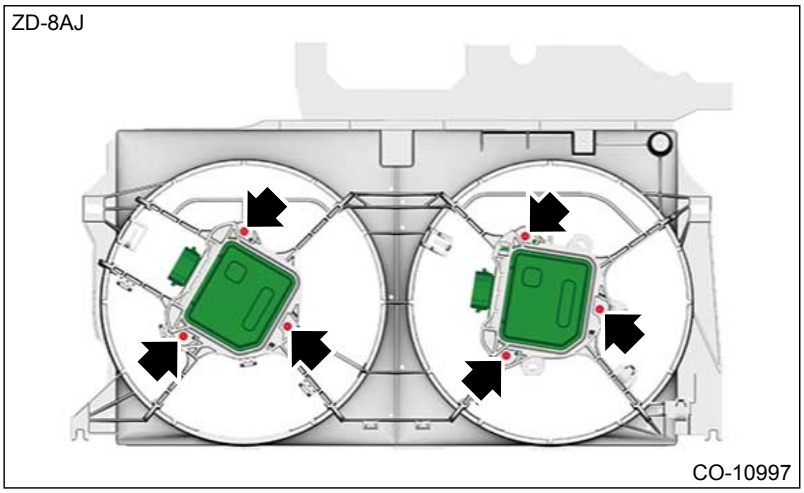
1. Install the clips.



2. Install each fan motor assembly.

Tightening torque:

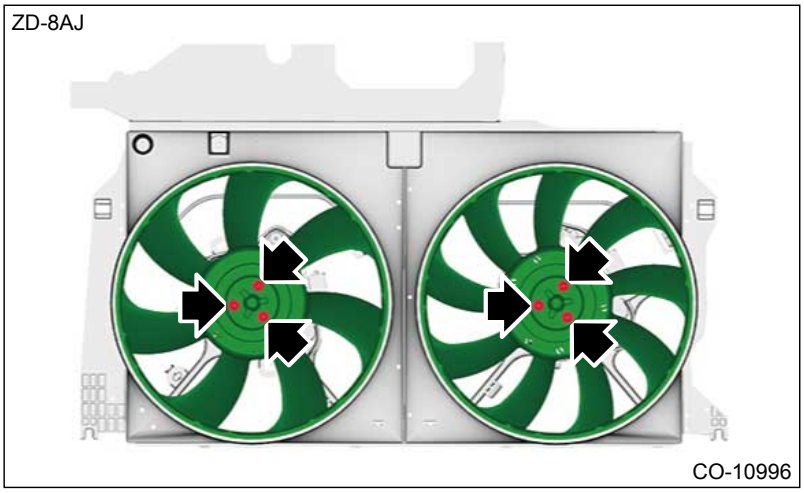
3.8 N·m (0.4 kgf-m, 2.8 ft-lb)



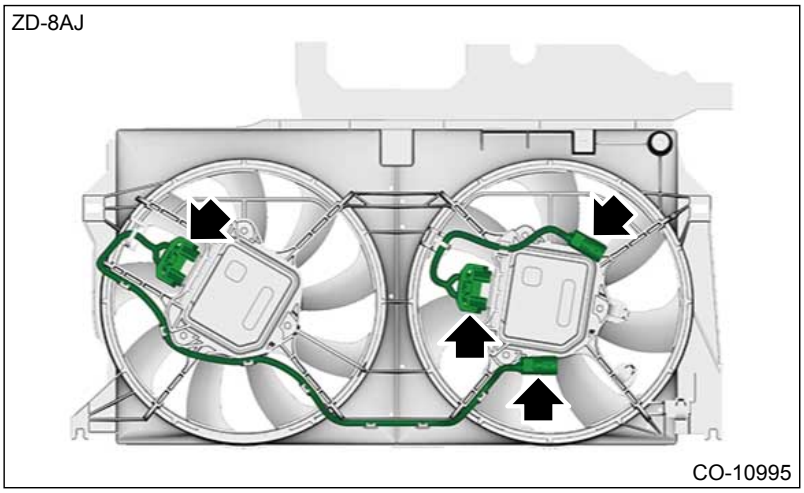
3. Install the radiator main fan and the radiator sub fan.

Tightening torque:

3.8 N·m (0.4 kgf-m, 2.8 ft-lb)



4. Install the radiator main fan harness and the radiator sub fan harness.



INSPECTION

Check that there is no deformation, cracks or other damages.

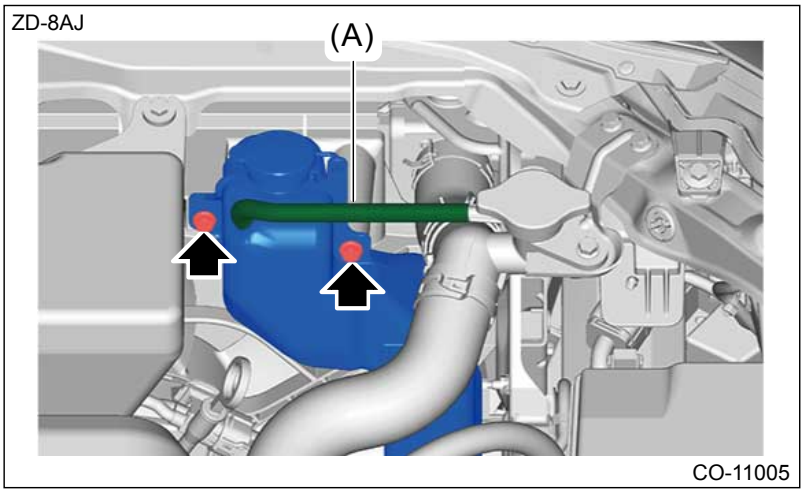
Note:

For information about operation confirmation, refer to the radiator fan system. Ref. to COOLING(H4DO)>Radiator Fan System>INSPECTION.

COOLING(H4DO) > Reservoir Tank

REMOVAL

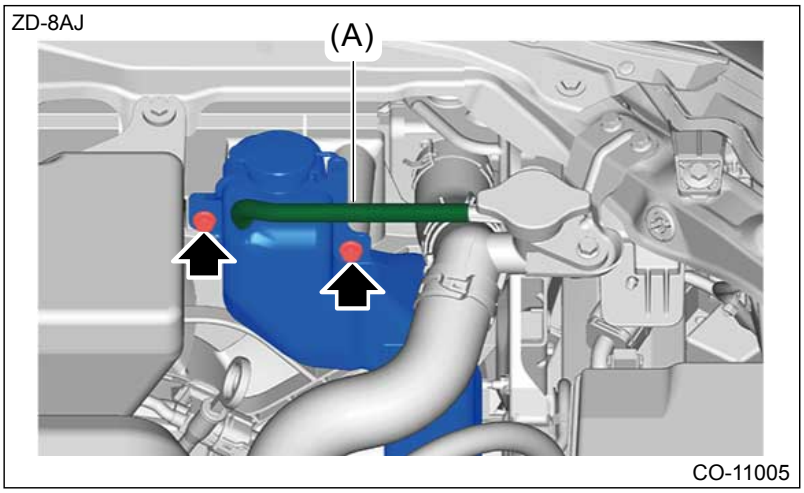
1. Pull out the over flow hose (A) from the reservoir tank.
2. Remove the reservoir tank.



COOLING(H4DO) > Reservoir Tank

INSTALLATION

1. Install the reservoir tank.
   Tightening torque:
   7.5 N·m (0.8 kgf-m, 5.5 ft-lb)
2. Install the over flow hose (A).



COOLING(H4DO) > Reservoir Tank

INSPECTION

Check that there is no deformation, cracks or other damages.

INSPECTION

Symptoms	Problem parts etc.	Possible cause
Over-heating	Insufficient engine coolant	Engine coolant leaks
	Engine coolant passage	Clogged engine coolant passage
	Radiator cap	Damage or deterioration of radiator cap
	Thermostat	Thermostat stuck
	Water pump	Damage of water pump
		Damage of V-belt or defective V-belt tensioner
	Radiator	Clogged radiator fin
	Radiator fan system	Radiator fan system malfunction
	Exhaust pipe	Excessive back pressure in exhaust pipe
	Cylinder block or cylinder head gasket etc.	Engine oil leaking into engine coolant passage
Over cooling	-	Ambient temperature extremely low
	Thermostat	Stuck or damaged thermostat
Engine coolant leaks	Thermostat cover	Thermostat cover damaged
		Gasket deterioration
	Water pump	Damage of water pump
		Gasket deterioration
	Water hose	Water hose damaged or deteriorated
		Water hose connection loose
	Water pipe	Water pipe damaged
		O-ring deterioration
	Radiator	Radiator damaged
		Radiator drain plug O-ring deterioration
		Damage or deterioration of radiator cap
	Heater core	Heater core damaged
	Cylinder head or cylinder block	Cylinder head or cylinder block damaged
		Cylinder head or cylinder block warpage
	Cylinder head gasket	Cylinder head gasket deterioration
Noise	Air mixed in the engine coolant passage	Insufficient air bleeding
	Water pump	Worn or damaged bearing
	Radiator fan	Deformation, cracks or other damage of radiator fan
	Radiator fan motor	Wear or damage inside the motor